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I.

BURIED NORSEMEN AT HERJOLFSNES

AN ARCHÆOLOGICAL AND HISTORICAL STUDY

BY

POUL NÖRLUND, Ph. D.
OF THE NATIONAL MUSEUM
COPENHAGEN

1924

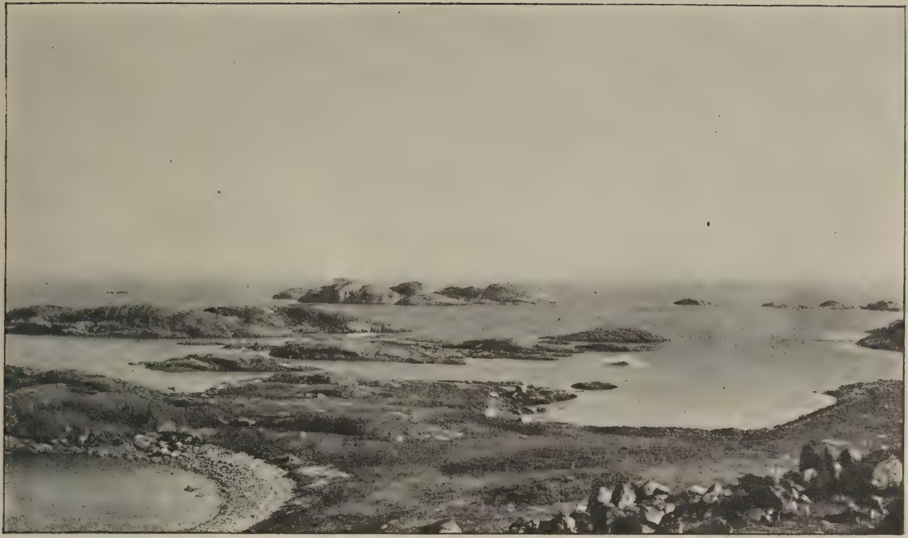

Fig. 1. Herjolfsnes.

Chapter I.

Herjolfsnes, its History in Ancient and Modern Times.

One of the first great achievements of the Middle Ages, which opened up the way to a cultural development even richer and more far-reaching than that of classical antiquity, are the voyages of the Northern navigators across the great oceans. The Ancients always coasted the shores of the continents. Rome gathered her provinces in a wreath around the Mediterranean. But even the Mediterranean never became the real highroad connecting the various parts of the Empire, and it is no exaggeration to say that the economical growth of the states of antiquity was decisively checked by the remarkably slow development of the means of communication.

The Northern navigators did not creep along the coasts, they put out to sea. They had — to begin with at any rate — no technical aids which the Ancients did not possess before them, purely psychological elements gave them the impetus needed — a more adventurous spirit, a greater indifference to death, or perhaps more ignorance of the risk.

But all their other achievements on the high seas fade into insignificance beside the magnificent sportsmanship of their voyages to Greenland and Vinland. For the just fame of Eric the Red as the discoverer and coloniser of Greenland, we must not, however, forget those who

1*

for centuries after maintained the difficult connection between Norway and the remote colony. Each time they went out again the country had, as it were, to be rediscovered, each time at the peril of their lives, or we may even say perhaps with the greatest probability of their never returning. This they knew quite well, nevertheless they did not hesitate.

Among the sources from which we derive our knowledge of the voyages to Greenland in the Middle Ages, there are some small unpretentious documents which in their own way, may affect the reader more by their laconic language than the picturesque verbosity of the Sagas. They are the old sailing-directions for the voyages. "Out of Herlø in Norway", it says in one of these, "one must steer due west for Hvarf in Greenland; and then the course should be laid north of Shetland, yet so that it can just be seen in clear weather, but south of the Faroes so that the sea is seen in the middle of the mountain slopes (i. e. so that the mountains are seen in half their height) and thus south of Iceland, that whale and bird may be had thereof."¹)

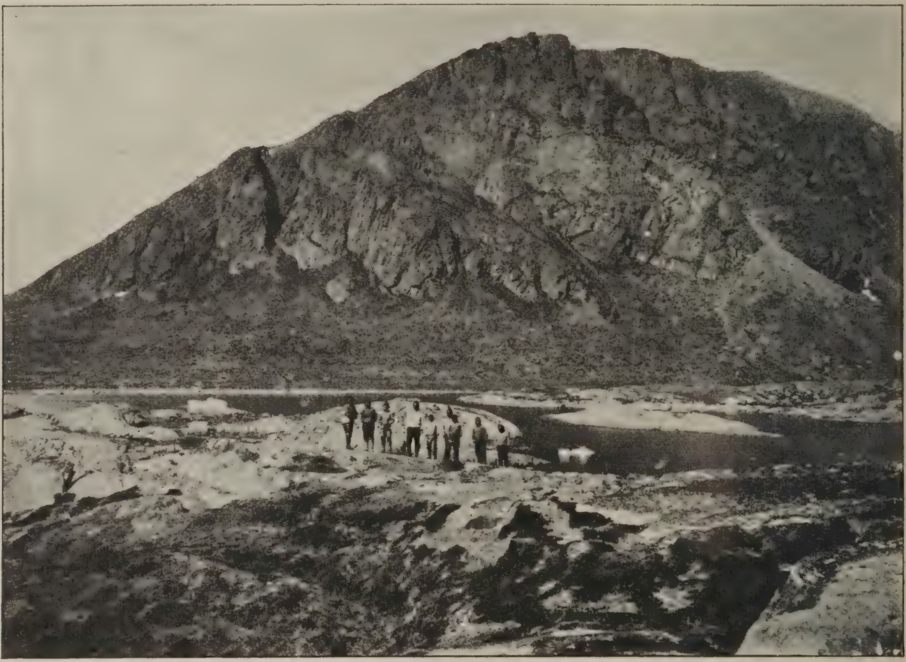

Fig. 2. The mountain behind Herjolfsnes viewed from one of the islets in the sea.

This was what the skipper had to guide him. Devoid of compass or other nautical instruments, and day after day perhaps without sun

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¹) Sailing direction from the Hauks-book, GHM. III, p. 212.

or stars, these voyages were like an instinctive groping across the great ocean which gives no information to the ordinary traveller, but from which the experienced navigator perhaps gleans many a hint as to his whereabouts in the course of his voyage.

But if he succeeded in making the land — in urging his vessel onward through the whirling gales off the south point of Greenland — then, on the very first day, he would catch sight of a broad and massive rock towering in majestic lines, which nobody who had seen them could ever forget. Then he knew that he had reached Herjolfsnes, where he could seek a haven at the port of Sand, unload his cargo, and begin to trade with the settlers.

Herjolfsnes was named after one of the original Icelandic settlers.[1]) Eric the Red had set out on his cruise of discovery as an outlaw, but after having investigated the possibilities of the Greenland fiords during three summers, he could freely return to Iceland. He did not, however, wish to stay there in the future, his only thought was to collect a following who would go with him to settle the new-found land which offered conditions as favourable as the north of Iceland.

Not later than the next summer, presumably in the year 985, the settlers set out from Bredefiord and Borgefiord with 25 vessels, but only 14 reached Greenland, the rest were beaten back or wrecked. On one of the 14 vessels was a man by name Herjolf Baardson from the district between Vaag and Reykjanes. He is mentioned first of all the Greenland settlers who followed Eric the Red, and by descent he was no doubt one of the most distinguished. He is said to have been a descendant of the Icelandic settler Ingolf.

The settlers divided the country between them, each of them taking possession of a fiord which was as a rule named after him, and thus arose the two Norse settlements in Greenland, the southern, called the eastern settlement (Østerbygd), in the present district of Julianehaab, and the northern, called the western settlement (Vesterbygd), in the fiords round Godthaab. But while all the other colonists sought shelter in the interior of the fiords, Herjolf Baardson forms a unique exception. "Herjolf took the Herjolfsfiord", it says, but "he lived at Herjolfsnes." Herjolfsfiord is the present Narssarmiut at Frederiksdal (Narssaq), it is one of the most beautiful among the fiords of South Greenland, surrounded by steep, ragged mountains, but below the mountains there is no open shore and the fiord is thus almost uninhabitable. Only on the two sides of the entrance to the fiord — Ikigait and

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[1]) In the following no reference will as a rule be made to the historical sources since most of the material will be found in Grønlands historiske Mindesmærker 1—3 (GHM.). See also the detailed account in Dan. Bruun, The Icelandic Colonization of Greenland (MoGr. Vol. LVII, 1918).

Narssaq — ruins of greater importance have been found. At its head it divides into two arms, one broad and short, stretching towards the north-east, now Kangikitsoq, where a large cataract rushes down the mountain side just inside the head of the fiord, the other, Amitsuarssuk, longer and quite narrow, wedging its way towards the north-west to the great Tasermiut (Ketilsfiord), to which there is a comparatively easy route overland (fig. 8). Close to the place where the fiord divides there are said to be some ruins,[1] which, however, we could not find when, after our excavations at Herjolfsnes, we went on a short expedition by umiak up the fiord. Judging by the ground it cannot have been any large farm, and it is the only one ever built in the interior of the fiord. At the head of Amitsuarssuk, where conditions were not at all unfavourable, there were no ruins to be found,[2] and at Kangikitsoq only a small outhouse of 1.5 × 2.5 m. built of pieces of rock without any use of tightening material. By its nature and situation it does not remind one of the store houses of the Eskimos. Most probably it belonged

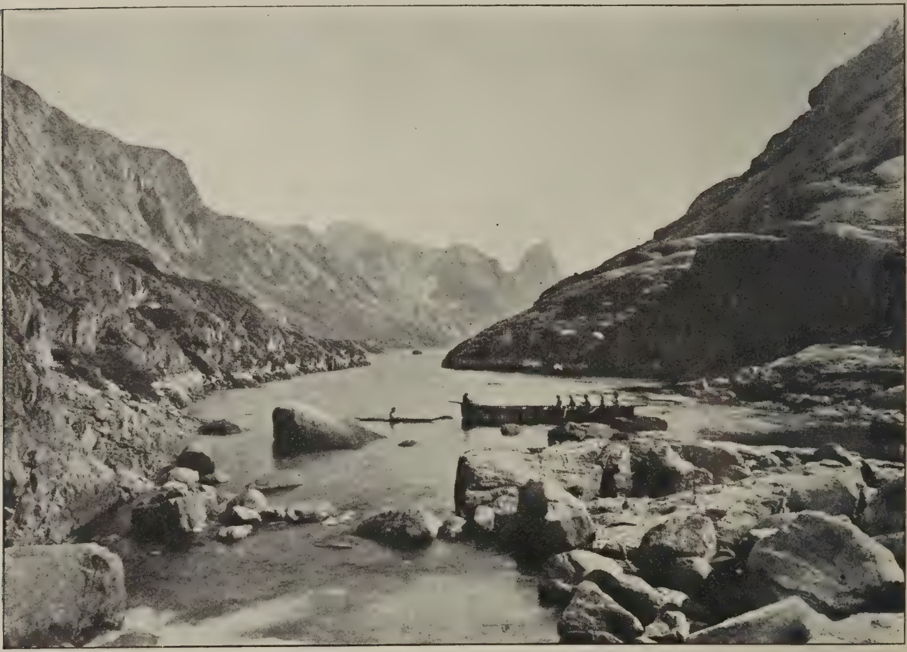

Fig. 3. Herjolfsfiord viewed from the head of Amitsuarssuk.

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[1] Annaler for nordisk Oldkyndighed 1838—39 p. 227.

[2] Missionaries from Frederiksdal found a solitary, insignificant ruin here in 1839, if it is not confounded with the ruin at Kangikitsoq (Ann. f. nord. Oldk. 1842—43 p. 329).

to the Norsemen who no doubt frequented this spot and drove sheep and goats to graze in the valleys.

In contrast to this desolate barrenness the neighbouring fiord, Tasermiut or Ketilsfiord is comparatively fertile, and must in the time of the Norse have been lined with farms. It would seem, then, that Herjolf made a bad choice, since there was not room for a single farm of respectable size in the whole of his fiord, while in several of the fiords of his comrades there were 20 farms or, in the most closely packed, even more. But perhaps he did not choose so much amiss after all when he alone of them all elected to settle on a headland by the open sea, on Herjolfsnes, the present Ikigait. Bleak and tempestuous it must have been, and when the gales blow inshore the sea-fog settles damp and grey on the low land. The huge broad-shouldered mountain is behind in the north-west, it is true, but the gales slip round it, one succeeding the other, and in dirty weather they lash the sea till foam and spray fly over the headland. Yet up the mountain slopes Herjolf had excellent pasture-land for his cattle, and the grass was no doubt more lush and nourishing by the sea than in the interior of the fiords¹) where a foehn-like wind, the *nigeq*, may often wither away all the grass and herbs. And for fishing and hunting Herjolfsnes was a good spot. Not only is there seal in plenty, but even the white bear may happen to pass that way.

But what especially made Herjolfsnes a valuable possession, procuring for its owner both wealth and distinction, was something entirely different, to which we have already referred above. There was, at Herjolfsnes, a harbour, called Sand, where the traders from abroad put into port. It was a "common port for Norwegians and traders", says Ivar Baardson, a Norwegian who spent a number of years in Greenland in the middle of the 14th century (1341—abt. 1364), as steward of the episcopal property²), and who must have been well qualified for gathering information about the country. When describing the eastern colony, after having mentioned the routes from Norway and Iceland, he begins with Herjolfsnes as the port of call of the ships, and continues by describing first what is east (and south) of it, next what is west (and north) of it. The importance of the place is thus clearly indicated.

A more exact statement of the situation of Sand-port we do not possess. At the present day there is no natural harbour at Herjolfsnes

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¹) This is even now the case according to the opinion of the experts who are conducting experiments on sheep-breeding in Greenland.

²) His brief but to us very valuable topographical description of the eastern settlement has only been preserved in a Danish translation. Some errors may have crept in, but on the whole the topographical information is reliable (best edition by Finnur Jónsson in MoGr. XX p. 322. See also GHM. III p. 248 seq.).

(Ikigait), and its place has therefore been looked for on the other side of the fiord, which is abt. 4 km. wide here, in the vicinity of the present Eskimo settlement Narssaq or Frederiksdal. When Moravian missionaries founded an establishment here in 1824, the congregation house — unfortunately demolished in 1922 — was built on the ruins of an old Norse farm,[1] and W. A. Graah has pointed out that abt. 1 km. south of Frederiksdal there is a small creek with sandy bottom and shore which might serve as a harbour for small vessels.[2] Possibly then, as is now generally supposed, this is the Norse Sand-port. It must, however, be pointed out that nobody now can tell how conditions were in medieval times on the opposite western shore of the fiord, in the immediate vicinity of Herjolfsnes. The sea has radically altered the old coast-line. The headland formerly projected much farther into the sea as we are reminded by a line of rocky islets beyond it (fig. 1). And it may be added that before very long the whole of the headland will have resolved itself into such islands, since the sea every year eats away part of the low land at the base of the headland where were situated the church and churchyard of the Norse farm — the chief goal of the expedition in 1921, and the theme of the present account. Only since 1840 the coast-line is known to have retreated abt. 12 m.

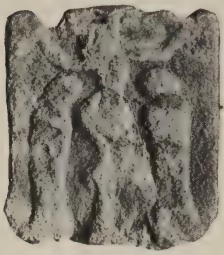
Fig. 4. Leaden plaque found at Narssaq (Frederiksdal).

This topographical question we must, however, leave unsettled, and we shall now proceed to detail the information about Herjolfsnes which has come down to us through Icelandic tradition. It fully confirms the importance of the place within the eastern settlement, where it was, in fact, only surpassed by Gardar, the old episcopal seat, and Brattahlid where Eric the Red and, after him, as a rule the lawspeakers lived.

After Herjolf his son Bjarne is said to have inherited Herjolfsnes if, indeed, he is a historical person. He is only known from the late and very untrustworthy "Tale of the Greenlanders" in the Flatey-book according to which he should have been cast ashore on the American continent before Leif Ericsson. The whole of this tale is, however, highly improbable, and even the existence of Bjarne remains doubtful.[1])

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[1] Die Missionen der evangelischen Brüder in Grönland und Labrador I p. 227 (1831). Graah, Undersøgelsesrejse til Østkysten af Grønland (1832) p. 38. Nord. Tidsk. f. Oldk. III p. 211. As early as 1778 Arctander had found four ruins on the spot, see "Samleren" VI, p. 1169. At Narssaq was found a small leaden plaque with a representation of the Crucifixion (14. cent.). Originally it has had two small holes at the top, and it reminds one of a pilgrim's badge (fig. 4).

[2] Graah l. c. p. 188. Missionary Val. Müller from Frederiksdal in a letter to the Secretary of the Royal Society of Antiquarians of $^{28}/_{6}$ 1839 mentions an exceedingly good and safe harbour at Pakitsok between Nunarssuit and Kangersuak $2^{1}/_{2}$ miles (presumably Danish miles) ESE of Ikigait. It is on the same side of the fiord as Frederiksdal, but nearer the sea.

When Thorbjørn of Løgarbrekka came to Greenland on his perilous voyage from Iceland to seek his friend Eric the Red, Herjolfsnes was the first port he made. As described in the saga of Eric the Red, he had roamed about on the sea all the summer, losing half of his crew, but by the beginning of the winter he contrived to reach Greenland where he was made welcome by Thorkil who then owned Herjolfsnes. Thorkil is mentioned in the saga as a clever man, the most prominent farmer of the district, who showed Thorbjørn and his whole crew great hospitality throughout the winter. As the leading man among the farmers, it fell to his lot, in the same year that Thorbjørn and his beautiful daughter Gudrid were staying with him, to receive into his house a certain sibyl ("völve") of the name of Thorbjørg. It had been a bad year, owing to scarcity of fish and seals, and it was considered Thorbjørn's business to ascertain

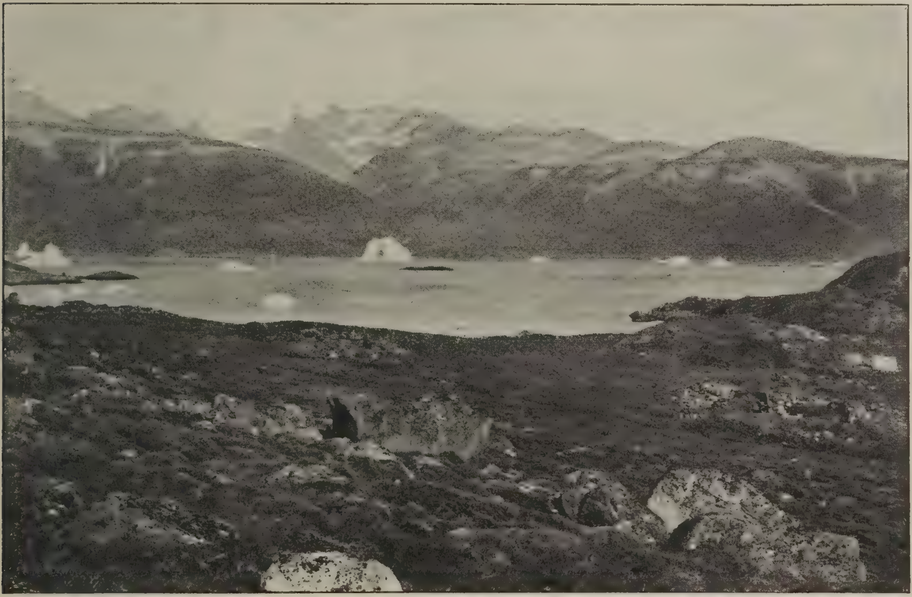

Fig. 5. View from Herjolfsnes across the fiord.

Behind the great ice-berg is Frederiksdal where the port of Sand is supposed to have been.

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[1]) According to Finnur Jónsson's hypothesis Bjarne Herjolfsson is no other than that Bjarne Grimolfsson who, according to the saga of Eric the Red, took part in Thorkil Karlsevne's voyage to Vinland, see AfnO. 1915 p. 221. I take this opportunity of correcting an error in a contribution to the American-Scandinavian Review (Sept. 1923) where I have followed the Tale of the Greenlanders in letting Leif Ericsson come to the American continent directly from Greenland.

when better times might be expected. The saga describes at length the solemn reception of the sorceress and how she puts forth all the apparatus of her heathen rites. This must have taken place shortly before Leif Ericsson came to Greenland (1000) — after his unintentional détour to Vinland — bringing with him the first Christian priest. But no one will, I think, maintain that a similar scene could not very well have occurred even after the actual introduction of Christianity.¹)

Herjolfsnes also plays a conspicuous part in the tale about the Icelander Skjald-Helge, who came to Greenland in the time of king Olaf the Saint, and became a law-speaker there, i. e. the highest judicial functionary. It is true that we only know this tale from an Icelandic poem of the 15th century, Skaldhelga-rimur, but this is presumably based on a saga which was again more or less based on a poem of the 11th century by the scald Hallar-Stein.²)

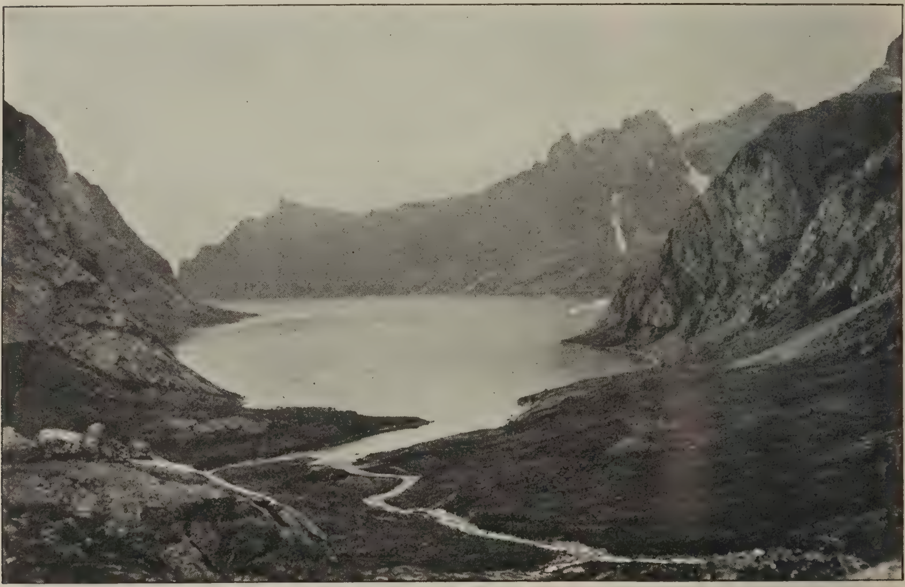

Fig. 6. View of Herjolfsfiord from Kangikitsoq.

According to this poem there lived at Herjolfsnes a farmer by name Skegge the Proud and, like his predecessors on the farm, he was a highly

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¹) It is worthy of note that the first Christian who came to Greenland was a man from the Hebrides who accompanied Herjolf Baardson on his first colonising expedition. It is said that he composed a poem, Hafgerdingadrapa, on a terrible tidal wave they met by the way. Four lines have been preserved (GHM. I, 180).

²) GHM. II, 419 seq. F. Jónsson, Den oldnordiske og islandske litteraturs historie III, 41 seq. Edv. Bull, Grønland og Norge (in the Year-book of the Norwegian Geographical Society 1919—21), p. 25 of the reprint.

esteemed man in the settlement. His wife was Thorun who like him was well-descended. Close to the farm, in a small house by the shore,[1] lived an elderly couple, Thorvard Hreim and Grima, with their sons. Grima was well versed in magic and taught it to her sons, and finally the obscure doings of the little family became so unpleasant that they were driven away. Thorvard was no doubt a small tenant under the farmer at Herjolfsnes. But the banished family revenged themselves. In the summer Skegge went hunting in the outlying districts in the north, but he never returned, and it was the opinion of his family that Thorvard and Grima's sons had murdered him.

Fig. 7. Rocks at Kangikitsoq in Herjolfsfiord.

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[1] In the immediate vicinity of Herjolfsnes there are no other traces of Norse ruins than those belonging to the farm itself, but following the coast to the west and north-west towards the Igdlokasik Island at a distance of 3 km. from the headland one comes across some very decayed and overgrown ruins of one or two Norse houses. Only a small outhouse of 8.5 × 4.5 m., built solely of stone without turf-tightening, is left as a fairly well preserved ruin close to the shore above a steep slope. A very distinct path is still seen along the shore leading away from Herjolfsnes. These little houses, where possibly Thorvard Hreim and Grima lived, were mentioned by Kielsen in a report to the Royal Society of Antiquarians in 1840. Ann. f. nord. Oldk. 1842—43, p. 333. Kielsen also mentions a mysterious grave of supposed Norse origin which we were not able to find.

Many wished to marry the wealthy widow at Herjolfsnes, but every man who became her affianced husband fell ill and died, and it was the general opinion that their death was caused by the magic arts of Thorvard's sons. In the meanwhile the Icelander Helge had come to Greenland after an adventurous and unsettled existence. In spite of his love for Thorkatla, a young woman in Iceland, he let himself be persuaded to woo Thorun, and after the usual attempts at bewitching the suitor had been happily averted, the wedding was celebrated with great sumptuousness. Helge's first duty must be a settlement with Skegge's supposed murderers. With thirty men he went north past the western settlement and succeeded in finding and overpowering them. With this feat performed and the large farm of Herjolfsnes at the back of him, he rose so much in distinction within the little community that he was elected law-speaker for the entire settlement. However, Helge was not happy, he could not forget Thorkatla, the love of his youth, and the wound opened again when she sought him out in Greenland. It is a curious fact that she had to go to Norway to obtain a passage to that country. Thorun of course did not receive her with enthusiasm, but she allowed her to remain the winter over on the farm watching her closely. Only

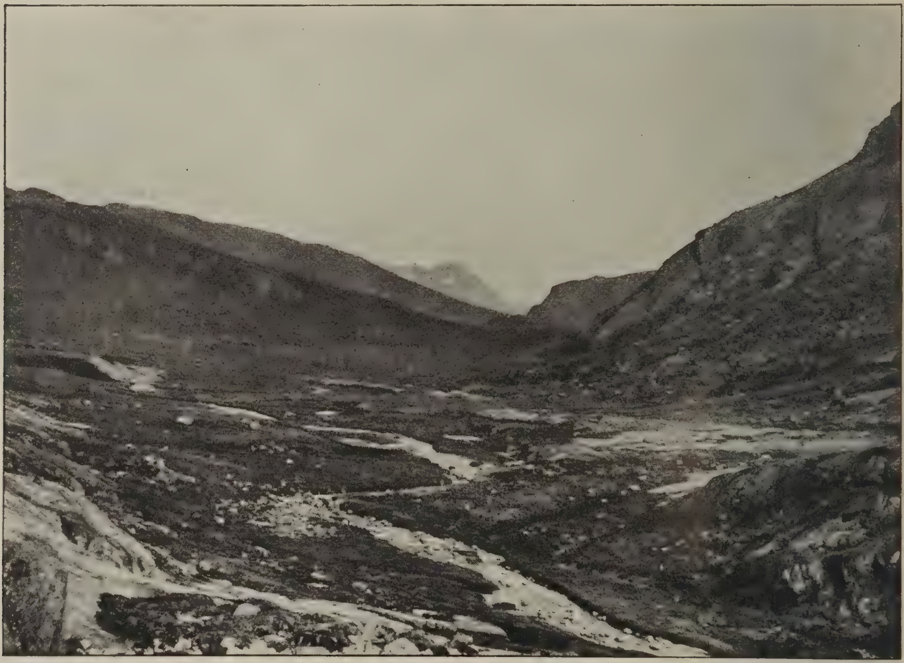

Fig. 8. Overland passage between Herjolfsfiord and Ketilsfiord.
View from Amitsuarssuk facing Tasiussaq in Tasermiut.

immediately before her departure next spring was she allowed to be alone with her beloved while three fires burnt down, and after her return to Iceland she gave birth to a daughter — in spite of all Thorun's efforts — who came out to her father when she was twelve years old. When she grew up and Helge had procured her a husband, he moved to Brattahlid, Eric the Red's property and the usual residence of the law-speaker. Perhaps Herjolfsnes went to the young couple!

In Gudmund Areson's saga we read about one of the sons of Thorgeir Hallesøn (d. 1169) by name Einar, that, on a voyage to Iceland, he was wrecked in the uninhabited regions of Greenland (presumably the southernmost part of the east coast) whence he tried, with two others, to cross the icecap to the colonies. They perished when they had only one day's journey left, and their corpses were found next winter. Einar's body was sound and uninjured and was brought to Herjolfsnes and buried there.[1] This is the first time the church, or rather the churchyard, is mentioned. We find it later on in the list of churches in the Flateybook[2] where it is mentioned first among the twelve churches of the eastern

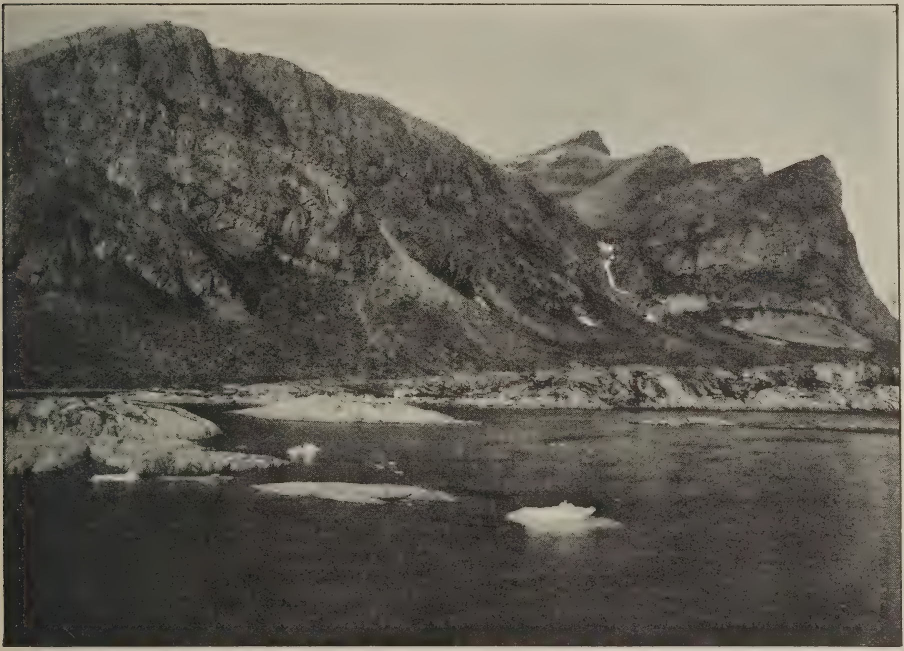

Fig. 9. The mountain behind Herjolfsnes viewed from the sea.

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[1] GHM. II, 752.

[2] III p. 454. GHM. III p. 246.

settlement. It is not, however, mentioned by Ivar Baardson,[1] but that may be accidental, since the finds of 1921 show conclusively that the church existed long after Ivar's time.

Even if these accounts should not all contain the full historic truth, they show beyond doubt that Herjolfsnes was one of the most important places in the colonies, or at any rate one of the best known, a name that rose easily to the lips of poets and authors in Iceland and Norway when Greenland was their theme. This is easily understood if Herjolfsnes was really the common port of call of the Norwegian traders, and Ivar Baardson's account is thus well supported by the rest of the historical evidence. It is necessary to lay the greatest stress on this fact to which we shall subsequently revert in another connection (chap. X).

A final corroboration of it we find in the curious account[2] of the Icelandic bishop Øgmund of Skalholt who on a voyage from Norway to Iceland (in 1534 or 1520?) was beaten off his course and driven towards the coast of Greenland. "Then he and other men thought they recognised Herjolfsnes in Greenland, it was late in the day and they got so near the coast that they saw people at the sheep-cots and sheep and lambs." Soon after, however, they got a fair wind, and already the next morning they could cast anchor in the Patricksfiord in Iceland at the time when the cows were being milked.

From this sudden but happy termination of their journey it at once becomes apparent that the bishop and his men were mistaken when they thought they had seen Herjolfsnes. But what is suggestive to us is that at so late a period Herjolfsnes still lived in the imagination of the Icelanders who must have had some idea of what it was like.

But with this the historical headland disappears irrecoverably in the icy fog for long centuries, and when the Norwegian missionary Hans Egede went out to Greenland in 1721, it was not to this old Norse port he went, but much farther up the coast.

The first to find Herjolfsnes again were the Eskimos. They called the place Ikigait, which means "the place destroyed by fire". It is difficult to know what is the foundation of this name. It may possibly allude to a struggle between the Eskimos and the Norsemen, but such a conjecture cannot be proved. Of the various, very numerous but rather valueless Eskimoic objects found during excavations at Ikigait, none is older than the 18th century,[3] nor are the many ruins of Eskimo huts of very old date. Possibly centuries may have gone by after the last Norsemen died or left the place, before the Eskimos settled there and possessed themselves of their relics. They found the old church-bell and broke it up into a hundred pieces to make points for their arrows.[1] But they can hardly have known that there was an old cemetery round the church, or they would not have built their houses over the dead as they did in more than one case.

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[1] Finnur Jónsson in MoGr. XX p. 299.

[2] GHM. III, 504 seq.

[3] In an Eskimo grave near building B were found some coins from the 18th century among which were a Dutch duit from 1739 and a copper coin from the Spanish Netherlands from the time of Philip V.

In 1834 the Royal Greenland Trading Board planted the outlying post Østprøven on the old historic headland, but it was given up again in 1877 after the death of the last manager Hagen. His widow and daughter continued there for some years although the Eskimos had left the place. For their support they kept goats which grazed on the green slopes as in the time of the Norsemen. For the rest they were forced to subsist on what the hunters from Frederiksdal brought them out of charity. One day the daughter perished on her way to the river for water, and her old, blind mother was left alone without knowing what had happened or how to help herself. At last she was found and brought to Frederiksdal.[2]

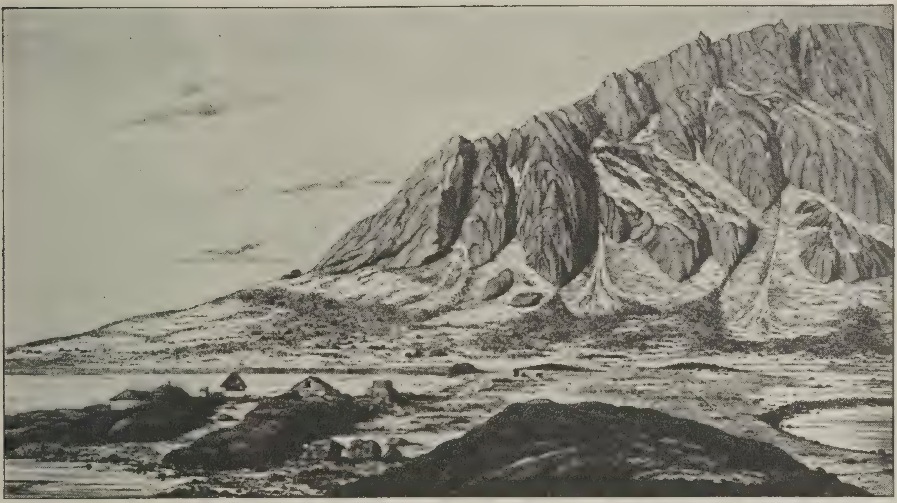

Fig. 10. The outlying post "Østprøven" at Ikigait.

From an etching by J. Magnus-Petersen done abt. 1855.

Since then the headland has been uninhabited. No goat grazes now on the lush grass which grows wild and chokes itself. When our expedition rowed inshore in 1921, the ravens circled above us declaring loudly their displeasure at being disturbed.

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[1] See below, chap. IX.

[2] MoGr. XXV p. 16.

When the connection between Europe and the Norse settlers in Greenland was interrupted in the latter part of the Middle Ages, the inherited knowledge of the situation of the two settlements was gradually lost. Of maps indicating their place there were none from the time of the Norsemen, and the sailing directions give no accurate information thereof. In the middle of the 17th century, then, the very natural mistake was made of placing the eastern settlement on the east coast of Greenland, while in the time of Christian the Fourth its proper place was still known.[1]) Hans Egede, the Apostle of Greenland, planted his station far up the west coast, in the very place where the old western settlement had been situated, because access to the shore was least hindered by drift-ice there, but it was his belief that the eastern settlement was on the east coast, and that descendants of the old Norsemen might still be found there. He himself made a journey in 1723 with the object of communicating with them, in case some of them should still be alive. But he got no further than Nanortalik, and the numerous ruins he passed in the district of Julianehaab he believed to be remains of the western settlement.

On this assumption one attempt after the other was made during the succeeding years to reach the east-coast, but the ice difficulties were so great that no really satisfactory investigation of the inhospitable shore could be made until G. HOLM carried out his famous umiak expedition in 1883—85.

The correct explanation, that the eastern settlement was situated on the southernmost part of the west coast, in the district of Julianehaab, had, however, been advanced already in 1792 by H. P. v. EGGERS, and had since, especially after the voyage of W. A. GRAAH in 1828—31, been more and more generally accepted. Eggers was also the first to arrive at the correct, or approximately correct understanding that the old Herjolfsnes of the Norsemen was situated on the northwestern side of the entry to the fiord Narssarmiut or Amitsuarssuk. Of the ruins at Ikigait he knew nothing, however, as they had not been found by AARON ARCTANDER who, on an exploration-expedition of great merit, made in 1777—79, procured the greater part of the topographical information about the Norse ruins from which Eggers drew his conclusions.[2])

The decisive determination of the exact situation of Herjolfsnes was arrived at in 1830 when missionary DE FRIES from Frederiksdal, on a visit to Ikigait, found a tombstone inscribed with medieval majuscules used as capstone over a door in an Eskimo hut.[1] It is the stone mentioned below as No. 104. It bears the inscription:— *Here rests Hroar Kolgrimsson.* From Ikigait it was taken to Julianehaab, whence the superintendent of the place, Mr. J. Mathiesen, sent it to the Museum of Northern Antiquities in Copenhagen.

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[1]) K. J. V. Steenstrup, Om Østerbygden, in MoGr. IX. 1 seq.

[2]) Arctander's account was published by Eggers in the weekly journal "Samleren" VI p. 1105 seq. (1793). See especially p. 1171 and the map. On his journey to the east coast, W. A. Graah found at Ikigait "some inconsiderable ruins, not mentioned by Arctander" (Undersøgelsesrejse, p. 54).

The rediscovery of Herjolfsnes cemetery which has since been one of the main starting-points of topographical studies, could thus be considered an established fact.[2] A few years later the place caused a certain stir for a short time. The secretary of the Royal Society of Antiquarians received a letter from commercial Assistent Ove Kielsen at Nanortalik stating that during the gales of the previous autumn a large piece of the shore at Ikigait had been washed away by the sea whereby a boat had come to view by the side of the Icelandic ruins. In the vicinity were found some fragments of cloth which, according to his opinion, might be the remnants of a sailor's jacket.

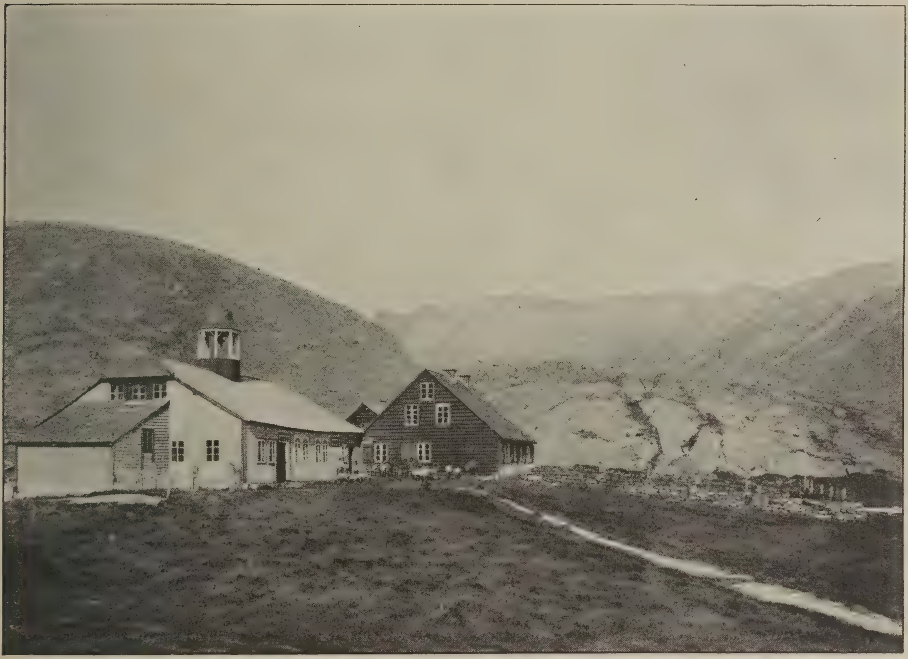

Fig. 11. The former Moravian settlement at Frederiksdal.
Church and congregation-house, now demolished.

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[1] Graah, Undersøgelsesrejse, p. 188. Nord. Tidskrift f. Oldk. I, 169 and 222 seq. III, 212 seq.

[2] Graah, p. 188. GHM. III p. 851.

In spite of Kielsen's opinion that it was most probably a vessel wrecked in a later century, the curious in Copenhagen pricked up their ears. Could it possibly be a Viking boat in which one of the old heroes had been buried?

Soon, however, information arrived from the missionaries at Frederiksdal that the planks found were derived, not from a boat, but from a coffin, and when Kielsen himself had the opportunity of visiting Ikigait in 1839 and instituted a trial digging lasting two days and a half, he found remains of several similar coffins, and in addition a skull with the hair preserved, the light colour of which proved abundantly that the buried bodies could not be those of Eskimos but must be the remains of the medieval Norse population. He could now report on the true but less romantic facts of the case, and send home the various objects found, among which were two wooden crosses — afterwards to be followed by many others —, some fragments of a tombstone (No. 105), and finally the above mentioned "sailor's jacket" which was put together to form the gown No. 33 described in chapter VI.

An interest in the churchyard at Ikigait had now been roused, and in the succeeding year the Royal Society of Antiquarians deputed Kielsen to make more extensive excavations. Quite a little expedition set to work. In the days from 2. to 7. August 1840 Kielsen with a working party of no less than 24 men made excavations throughout the church and churchyard and in addition throughout the other ruins on the headland. These excavations, however, only resulted in disappointment. A wooden cross and a couple of tombstones were found (Nos. 106 and 107 below, and fragments of No. 105) but otherwise merely some valueless fragments of woven material, of soapstone etc. The enormous amount of 36 Rigsbankdaler (equal to 72 Danish Kroner or abt. £ 4) was expended on this investigation, and the minutely detailed journal which Kielsen sent to the Society of Antiquarians testifies in the most pathetic way to his distress at the modest results.

In Copenhagen the interest in the investigations gradually cooled, and all the more so since Kielsen himself described how every part of the churchyard — except the eastern part where some Eskimo huts prevented it — was "dug up and turned over to a depth of 2 or 3 feet."

And yet, every time the sea carried away part of the shore, fresh burial remains came to view, and the place was visited both by Danish functionaries in Julianehaab and investigators who were exploring South Greenland, and was thus continually kept in mind. In 1849 the Rev. Westerboe sent a wooden cross from Julianehaab, in 1852 a similar one was sent by Inspector Holbøll, and in 1855 Dr. H. Rink who was then superintendent of Julianehaab, made a minor excavation in which fragments of cloth, half a wooden cross, and some skulls were exhumed. In 1860 the manager at Østprøven, cooper HAGEN, sent to Copenhagen some pieces of cloth found at the shore, and supposed by him to be remnants of a monk's cowl. In 1880 Lieutenant (now Commodore) G. HOLM made a small excavation in the churchyard,[1]) and further diggings were made in 1900 by Dr. MELDORF and in 1906 by the author MYLIUS-ERICHSEN. In 1907 and 1910 the National Museum again received some small objects from the place from doctors DEICHMANN and BENTZEN, and when Mr. MOGENS CLEMMENSEN, the architect, was staying at Julianehaab in the summer of 1910 to explore the Norse ruins, he tried to reach Ikigait, but was prevented by ice-difficulties.[2])

It had thus become obvious to the Commission conducting the scientific exploration of Greenland that Kielsen's digging had not been exhaustive. On the other hand, all the information obtained showed that the shrouds found in the churchyard, which were of special interest, were so fragile that they went to pieces every time an attempt was made to take them up. The Commission then opened negotiations with the National Museum about a technical archæological excavation of the churchyard, and after some delay, caused especially by the great war, the result was an archæological expedition in 1921, whose proceedings and results will be described in the succeeding pages.

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[1]) MoGr. VI p. 136.

[2]) MoGr. XLVII p. 355.

Chapter II.

The Expedition to Herjolfsnes in 1921. Voyage, Excavations and Conservation of the Finds.

Our expedition left Copenhagen on May 15th 1921 onboard the small screwsteamer Fox II belonging to the Cryolite Mining Company, with Ivigtut, the Danish cryolite mine in Greenland, the only one in the world, as our temporary goal. It was Whitsunday and a fine summerlike morning when our vessel bore up through the Sound. The sun shone brightly on the beechwoods just in leaf all along the shores of Sealand, and even though we soon came to feel the cold when we entered the larger waters, this smiling Danish landscape was still fresh in our memories when, 16 days after, we ran into the Arsukfiord and saw Greenland extended before us in all its stern wintry grandeur. The snow had only melted in spots on the mountains, in many places it still lay in the valleys, the bare, grey rock began to peep out here and there, but it was difficult to get a glimpse of verdure anywhere.

Early in the previous day when off Nunarssuit (Cape Desolation) we had for the first time come across the "Polar ice", that belt of ice-pack that drifts along the east coast of Greenland from the Arctic, rounds Cape Farewell, and, far into the summer, blocks up the southern part of Greenland's west coast until it finally disperses farther north. We followed it some way, until our excellent leader, Captain Rasmussen, towards noon found it sufficiently scattered to attempt a passage. Rocked by the waves the heavy ice beat boomingly against the planks of the ship, but in a couple of hours we had passed the outermost and most dangerous belt; behind it lay several narrower ice-belts, more easily passed because the water was still there, and some time of the evening we had left the barricades behind and could freely head for land. At sunrise we were called out, we were then already under the Greenland mountains, and soon the first Eskimo kayak-man approached us. A noose was laid round the slender stem and stern of the little skin boat, and the little brown man was lifted onboard with his boat as if he were one with it. But he quickly crawled out of it, mounted the bridge and piloted us to Ivigtut through the windings of the Arsukfiord.

The first qualification needed for carrying out anything in this place where the forces of nature are so powerful, is an illimitable fund of patience. Even in the great polar expeditions this is perhaps quite as necessary a qualification as daring and resourcefulness. To a person coming to Greenland for the first time, and having that sense of the value of time which accompanies our civilisation, the eternal, forced idleness is to begin with extremely distressing, and even on a small trip like ours, which in the nature of an expedition is hardly worth mention, there was ample occasion to become hardened in idleness. We had many tasks to perform during the short summer months and were in a hurry to get to the south where our field of work lay, but hardly was our equipment landed before our reverses began in the shape of a violent storm accompanied by torrents of rain. A large Danish steamer carrying a cargo of cryolite attempted at that time to start on her return voyage and leave the Arsukfiord, but after a couple of hours she returned and cast anchor in the fiord, and what was impossible to the large steamer, we could not of course think of undertaking in the small motorboats provided for the continuation of our voyage.

Fig. 12. Polar ice at the coasts of the "Østerbygd".
(phot. M. Clemmensen).

Hence followed three days of idleness in which we made our first acquaintance with the Greenland "nigeq", the unpleasant warm south-easterly wind which, like the scirocco of southern Europe, gets on one's nerves, and the greatest metereological peculiarity of which is that despite its warm or sometimes even hot character, it comes direct from the inland icecap. It was to trouble us often enough later on, but at the same time it benefited us by contributing to dispel the winter. Day by day the dark spots in the ice grew larger, the winter's ice which still lay firm in the narrower channels, was torn loose, but it was long before the hard, deeply frozen earth was fit for excavation.

This we experienced when on the sixth day following our arrival in Greenland we left Ivigtut and, on our way out through the Arsukfiord, visited the little island Napassut where a runestone was found in 1913 which at the instigation of the functionaries in the cryolite mines was sent to the National Museum in Copenhagen. The young Eskimo who found the stone and who will now for the rest of his life bear the name Peter Runestone, accompanied us as guide on this part of the way. It was curious that a tombstone should have been found in the little islet where there can never have been any church, and we wanted to examine the small ruins on the spot in order to ascertain whether they were Eskimo remains or might be Norse. It seemed most probable that they had been built by the Norse who might have kept some cattle on the island, but when we began digging in order to examine them more closely, we came upon the hard frozen bottom already at half a spade's depth. It was then at once clear to us that we need not hurry to Ikigait where the chief action of the summer was to take place, for it could be foreseen that digging there must be carried out at considerable depths and would have to be done cautiously. It would not do to hack up the earth, but it would have to be thawed up before we could dig in it.

The result of our visit to Napassut was therefore that we resolved for the time being to devote ourselves to various subsidiary tasks already planned at home, more especially the exploration of several less well-known parts in order to ascertain if there were traces of Norse settlements.

Ivigtut is situated in 61.2° N. lat.; in regard to administration it is an isolated enclave within the southern part of the district of Frederikshaab, while Ikigait for which we were heading, is in the southern part of the district of Julianehaab in 60° N. lat., only abt. 50 km. distant from Cape Farewell. Hence our route lay to the south with the winter ice on our left hand, the drift ice on our right. Torssukatak and Nyboes Channel, the usual short cuts to Julianehaab, being still ice-bound, we had to round the great promontory at Nunarssuit, a difficult passage through closely packed drift-ice, but on the afternoon of June 8th we reached the outlying post of Qagsimiut where we cast anchor and went ashore, and where we got our first "kamiks", the indispensable Eskimo boots of sealskin. The manager, however, advised us not to remain there, because we might risk being closed in by the ice-belt, perhaps for a week, perhaps longer. After some discussion the result was that we continued our voyage before evening, sailing throughout the semi-light night in the depths of the fiords to escape the drift-ice, sheltered behind the isles of the Julianehaab archipelago, and proceeding outwards again by gentle stages until early the next forenoon we reached Julianehaab, the modest capital of the district in which we were to pass the summer.

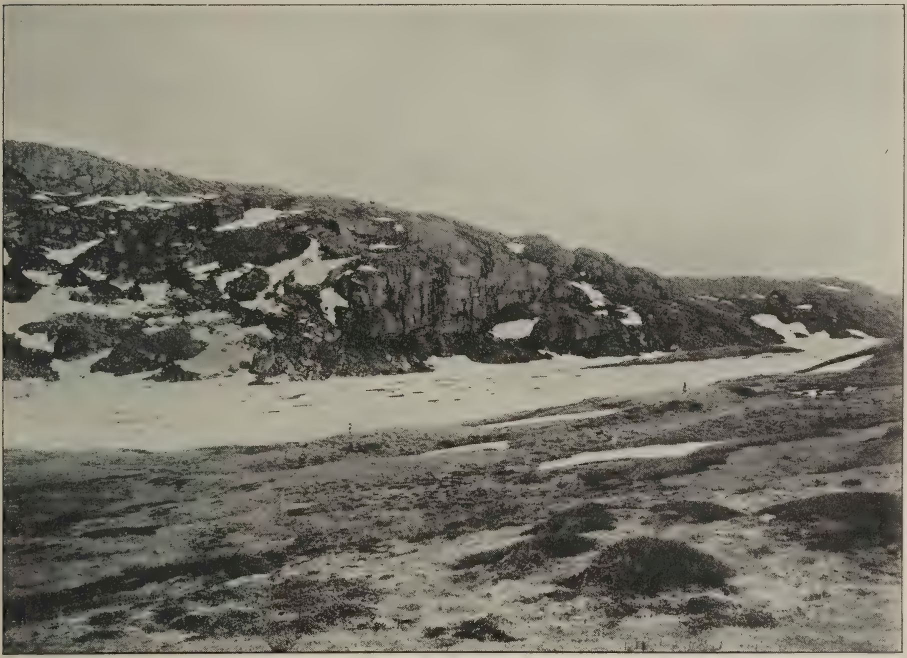

Fig. 13. Site of Norse farm on the island of Tugtutôq.
The farm stood abt. 3 km. from the shore, by a lake still frozen abt. 10. June.

We did not, however, allow ourselves to stay long at Julianehaab. Already the next day we set out on an expedition to the ice-free regions behind the colony where, be request of Captain Daniel Bruun, we explored the large island of Tugtutôq (the Reindeer Island), called Langey (the Long Island) by the Norse, to ascertain if there were any more Norse ruins than those already known. We succeeded in finding two hitherto unknown sites besides a third of less reliable character, and after various small détours we returned to Julianehaab on June 14th whence we continued our journey southward on the same day, carrying with us our whole equipment, and in spite of ice, wind, and damage to our motors, the next day we arrived at the trading-place Nanortalik which became as it were our established base throughout the summer. It was from there we fetched all the different supplies we needed, being always faithfully aided by Superintendent Laur. Mathiesen in whose hospitable home at Nanortalik we repeatedly enjoyed sweet repose after the hardships of our journeys.

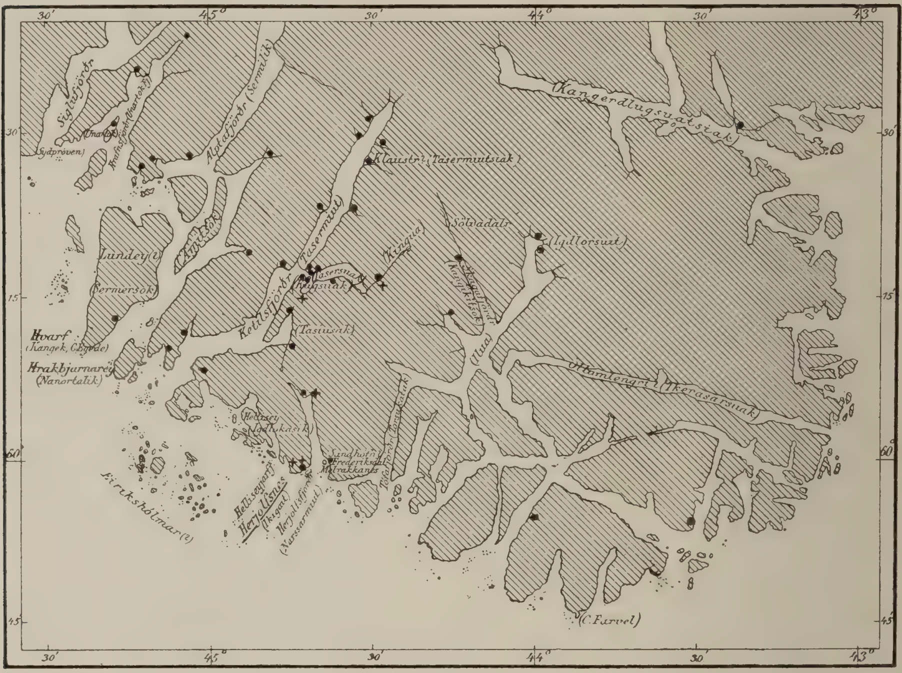

Fig. 14. Map of the southern part of the Østerbygd.
● Site of Norse farm, ♁ farm with church, + smaller ruins.

Hitherto our journey had taken place in European vessels. We started from Ivigtut in the motorboat "Qaleralik" (The Halibut) in which Mr. Rasmussen, the officiating superintendent of Julianehaab, had kindly accepted us as passengers, until we could be put onboard the colony's motor schooner "Björnen" (The Bear) which took us to Julianehaab. Here the sheep-breeding station kindly lent us their motor-boat "Vædderen" (The Ram) which only left us at Nanortalik. Thenceforward throughout the summer we were reduced to the almost exclusive use of Eskimo means of transport, and we very soon made ourselves at home in the umiak or "woman's boat", in which travelling, especially on shorter trips, assumes its own pleasant and cosy character. A quiet summerday on one of the deep fiords in an umiak with softly singing rowing-women whose unassuming melancholy song seems to accentuate the great solitude, is one of the unforgettable experiences which travelling in South Greenland offers the stranger.

For the present, however, we did not see much of the quiet summer-days. It was still too early to go to Ikigait to begin the excavations, because of the ground being frozen at a spade's depth. We therefore resolved to give a week to an umiak expedition to the Tasermiut (the Ketilsfiord of the Norse), far-famed as one of the most beautiful fiords of Greenland. As it had as yet only been insufficiently explored for relics from the time of the Norse, a journey to this place was specified in our instructions as one of our subsidiary tasks. According to Ivar Baardson's topographical description, there have been two churches and a monastery in this fiord. It cannot be said that their situation has ever been conclusively established. We started on this expedition on June 17th in the forenoon with a crew of young male rowers who would be able to act as diggers at small trial diggings, should occasion call for it, but unfortunately we never reached our goal owing to the obdurate refractoriness of the weather. After twelve days had been spent mainly in lying in our tents waiting for brighter prospects, we fled, devoid of supplies (a hateful situation to Eskimos) and in rather a reduced state, to Nanortalik which we entered in a torrent of rain.

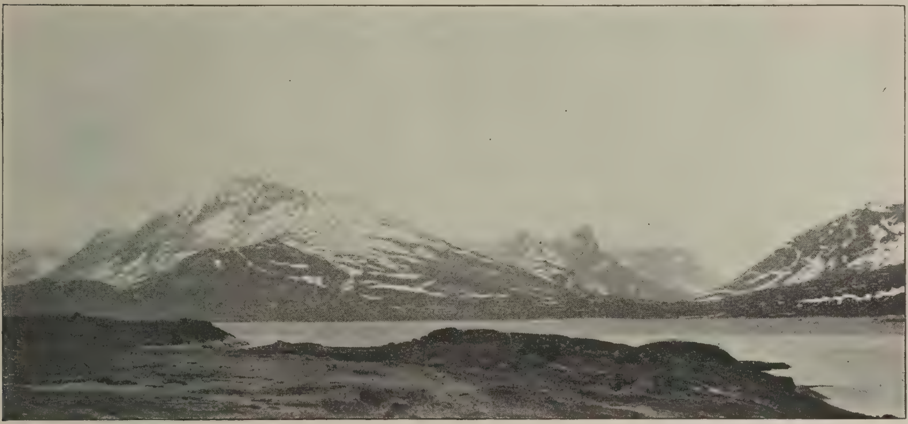

Fig. 15. Tasiussaq Creek, Tasermiut (Ketilsfiord).

Although we only managed to explore barely one-third of the fiord, we found five hitherto unknown farms on this stretch and possibly determined the site of one of the churches (at Qaqatsiaq between Taserssuaq and Tasermiut), but the monastery we did not reach. An account of this expedition and the other topographical investigations made occasionally in the course of the summer, will subsequently appear in another connection.

We had now reached June 28th. A month had passed since our arrival in Greenland, and it was important that we should get to Ikigait before the summer should be entirely spent. But if rain and wind had been against us in Tasermiut, it was now the ice-belt that came in our way. The route from Nanortalik to Ikigait runs for the greater part outside the skerries, but the wind had pressed dense masses of drift-ice against the shore, thus preventing all passage. Day after day passed without any improvement but with growing impatience especially on my part. At last, during the first days of July, it seemed to us that the ice was beginning to scatter so that a channel might be found through which to effect a passage, but the Eskimos would by no means admit this, and we considered it too risky to enforce a departure without their approval since they were the only persons able to judge both of atmospheric and ice conditions.

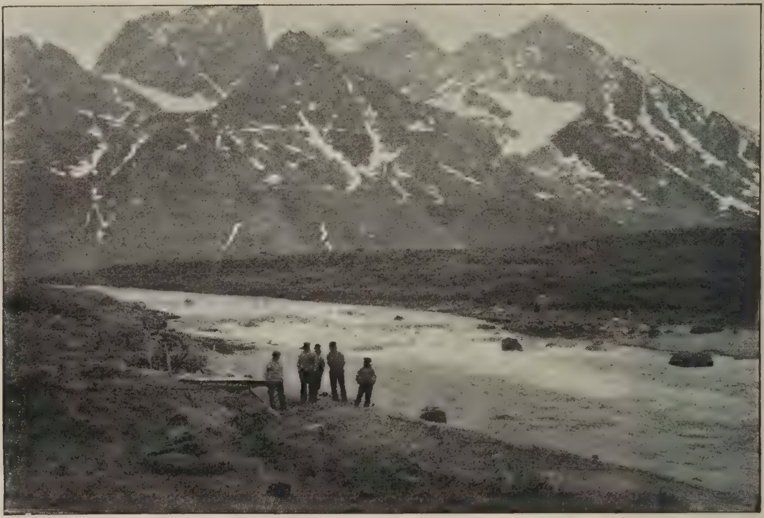

Fig. 16. The great river Kugssuaq in Tasermiut.

By the river, which abounds in salmon, is the site of an old Norse farm.

We realised, however, that they did not take an impartial view of the case. They simply would not leave during these days. The greatest festival experienced in Greenland within the memory of man was immediately imminent. On the third of July it was the 200th anniversary of the arrival in Greenland of her apostle the Norwegian missionary Hans Egede, and here as everywhere else festivities were in preparation which none of the natives cared to miss. On the contrary, they came pouring into the colonies from the summer hunting places where they were for the time being hunting seal, to take part in the festivities, and the steersman of our umiak went so far as to say that it would be a grief he should never get over if he could not be present on this occasion. We yielded to this view of the situation, and now afterwards I should think that anybody who knows how few are the events life offers in such a remote part of the globe, will admit that we should have acted inhumanly by forcing him to leave.

Hence we took part in the festivities which in all their unpretentiousness and simplicity perhaps became just as unforgettable to us as to the natives. All assembled in the church, from the old bent women — and in no other country, I think, are the old women so bowed down with age as here — to the tiny babies at their mothers' breasts, while the young girls wearing their gay bead-collars added brilliance to the throng. When the service was over, a general cannonade most unexpectedly broke loose. Each hunter went home and fetched his gun and fired a salute outside his house-door in praise of Hans Egede and the Almighty. After that the "banquets" were served. No undue consumption of liquor disturbed the general happiness, spirits being prohibited among the Eskimos; only a single man who had taken an ample quantity of the harmless "white beer" provided for the occasion felt induced to play the rôle of a drunken man. But all through the

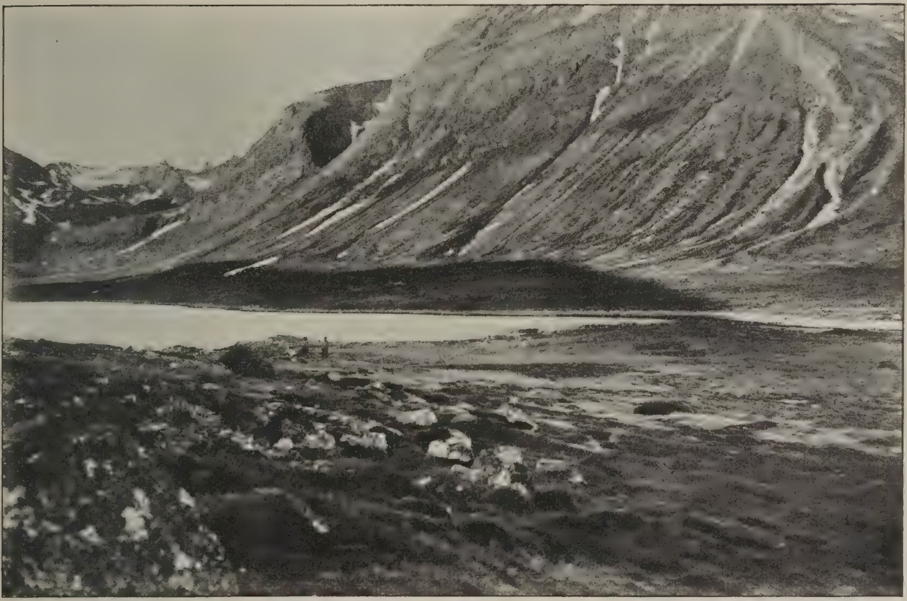

Fig. 17. Tasiussarssuk Creek, Tasermiut.

In the foreground Norse ruins.

evening and far into the night, we heard the tramping of the young people at their dances.

Already on the festive day itself the Eskimos confided to us that they now really thought the ice was beginning to diminish, and the next morning they declared it possible to start. Without being naive we could only be glad at this sudden and fortunate change of the ice-conditions. Hastily taking in stores, we started early in the forenoon in our closely packed umiak, followed by the workmen we had engaged, four in number, in their kayaks. We stipulated that they should come each in his own boat, so that they might return home in case there was dissatisfaction on either side.

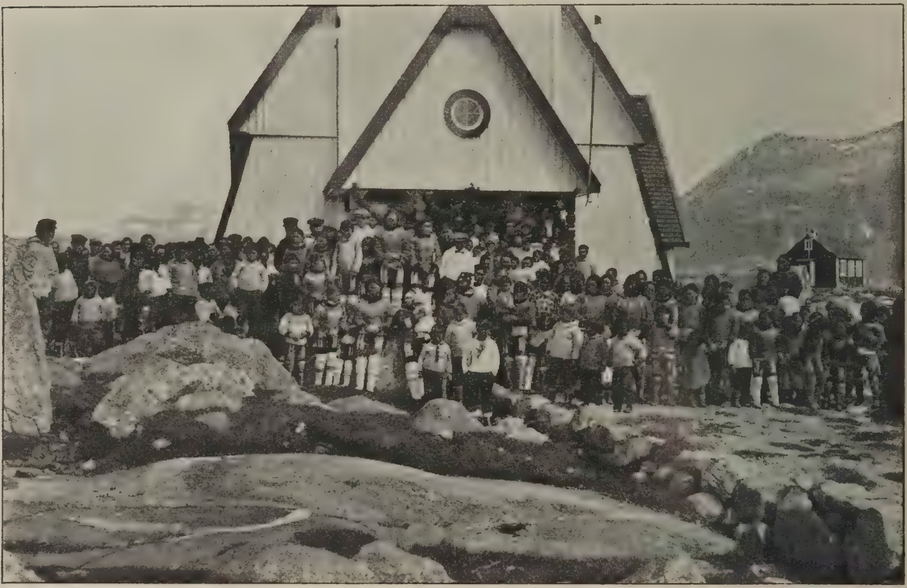

Fig. 18. Before the church at Nanortalik. Hans Egede festival, July 3. 1921.

It was a splendid, warm and quiet day, one of the few fine days of this summer. The sun shone gloriously on the white ice-masses through which we passed. Sometimes it looked as if the ice were closing in round us, but our kayak-men always found a way out, and by 4—5 o'clock in the afternoon we at last pulled our boat ashore at Herjolfsnes below the majestic mountain of Ikigait.

We took our bearings while the cargo was being unloaded. It was with some difficulty that we found our future field of operation, the churchyard-site. The ruins of the church were almost quite overgrown with grass and furtle, only a few stones peeped out here and there, and it was not without alarm that I saw how the sea had encroached upon the land near it. Our first endeavour was to find a favourable place for our tents as near as possible to the field of operation. This place was to possess various qualities. It was to afford shelter from the storms and soft ground to lie upon. On the other hand it was to be on high and detached ground to prevent too bad an attack of mosquitos, and it must be on a spot where there was fresh water near and suitable places for cooking. Even though we could not find a spot so paradisial as to satisfy all these claims, we soon made our choice and set up our two tents, in the good old way of the Eskimos, quite close to the shore, one being for the Danes and one for the Eskimos, the workmen and our "handmaid" Elginda (Helga). The latter who had accompanied us from Julianehaab, served us faithfully all the summer, cooking our food and attending to our kamiks.

Fig. 19. Girls in festive attire. Hans Egede festival.

The next morning, July 5th, we began the excavations which were continued, as a rule both Sundays and weekdays, until August 27th. We began with a series of draining operations. Some small stagnant fresh-water lakes in the vicinity were drained dry to prevent too many raids by the dreaded mosquitos. The many little rivers streaming down from the mountain across the field of excavation were diverted. Both these undertakings were no doubt useful precautions, we had water enough to battle against during the excavations, as the frozen ground gradually thawed and gave out all its humidity; and we were fairly free from mosquitos, though this was perhaps less due to our draining operations than to the cold summer and the wind blowing continually across the headland.

We worked hard during the seven weeks or more the excavations lasted, but we were well repaid, for almost every day brought good results. It took some days, of course, before we got down to the yielding layers, but when the first difficulties had been conquered, the finds came in rapid succession. On July 8th we found the first wooden cross, on July 9th the first coffin, and on the 11th the first costumes, and simultaneously with the excavation of the churchyard the interior of the church itself was cleared of fallen stones. On August 17th the excavation of the churchyard was brought to an end, and that last day was, curiously enough, the richest in results, for on that day we exhumed the best preserved of all the gowns (No. 39) and no less than three hoods (Nos. 77, 78 and 80) and a pair of hose (No. 88).

Fig. 20. Eskimo visitors.

The succeeding days we employed in excavation of the other buildings on the farm. Like the church two of these had been partly dug up by Kielsen, but the greater part of the dwelling-house had not been touched by him, it lay undisturbed under the mounds of green grass. I had hoped we should have been able to uncover it entirely, but we had not nearly time enough. The walls lay very deep and were partly covered by fallen stones of very large size which could only be removed slowly. There seemed to be remains from several different periods and a packing of timber below the walls which excited our curiosity as it must date from an earlier building. But in order to arrive at a result we ought to have had another month for the work. The ground ought to have been methodically cleared of all superfluous earth and stones as it was done in the church, but instead we were obliged to content ourselves with digging narrow trenches along the walls we came across, having for this site only four days which were moreover disturbed by rain and storm. On the 27th I stopped the excavations in order that we might finish packing the cases with the finds. Twelve large cases in all were sent on the same day by the schooner "Maagen" to Nanortalik whence they were taken to Julianehaab in the motor schooner "Bjørnen".

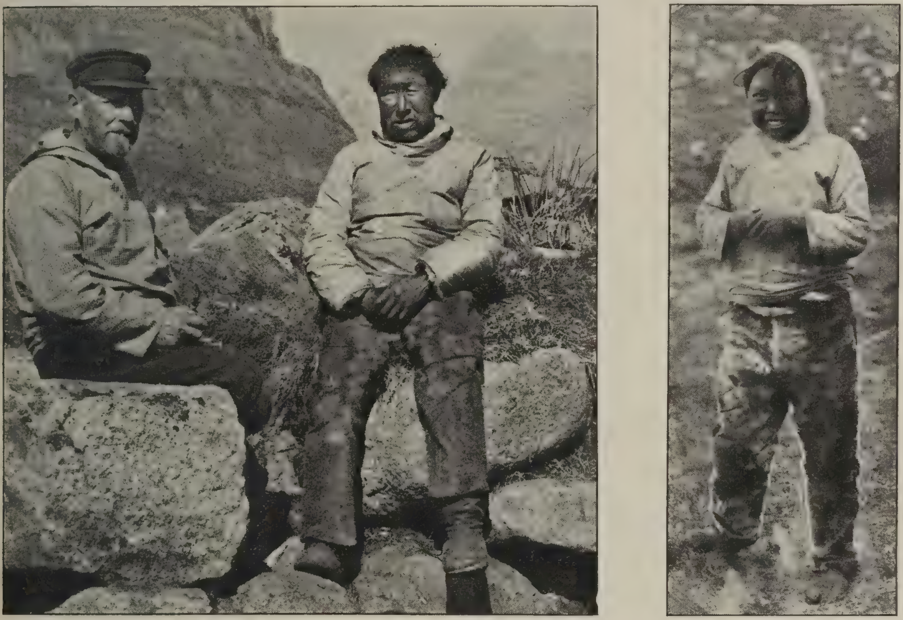

Fig. 21—22. Two of our best friends. Left, Mr. Johan Petersen.

While the result of the diggings will be dealt with in more detail in the succeeding chapters, we shall here say a few words about our assistants, the Eskimo workmen. I cannot give them praise enough, their power of work exceeded every expectation, and the good result is in great part due to them.

The Eskimos are known to be of a kind and peaceful disposition, but they are said to lack perseverance at regular work, which is only natural among a population of free hunters. But during the excavations they showed not only the watchfulness of the hunter — and on this point they far surpassed the European worker — but also an astonishing patience and steadiness. The best of them were first-class archæological assistants. There was especially a young fellow from Nanortalik, Agu (Augustinus), who little by little became my right hand man and to whom I could entrust even difficult tasks.

That the work progressed so steadily was no doubt due in great measure to the fact that we ourselves took part in it all the time and, in addition, to the fortunate circumstance that there was no day that was not enlivened by new finds. We also introduced a very effective system of rewards, so that a gratuity was paid for all finds according to their value. My estimate was awaited in great suspense, and was always accepted without criticism, even if it did not exceed 1 Øre.

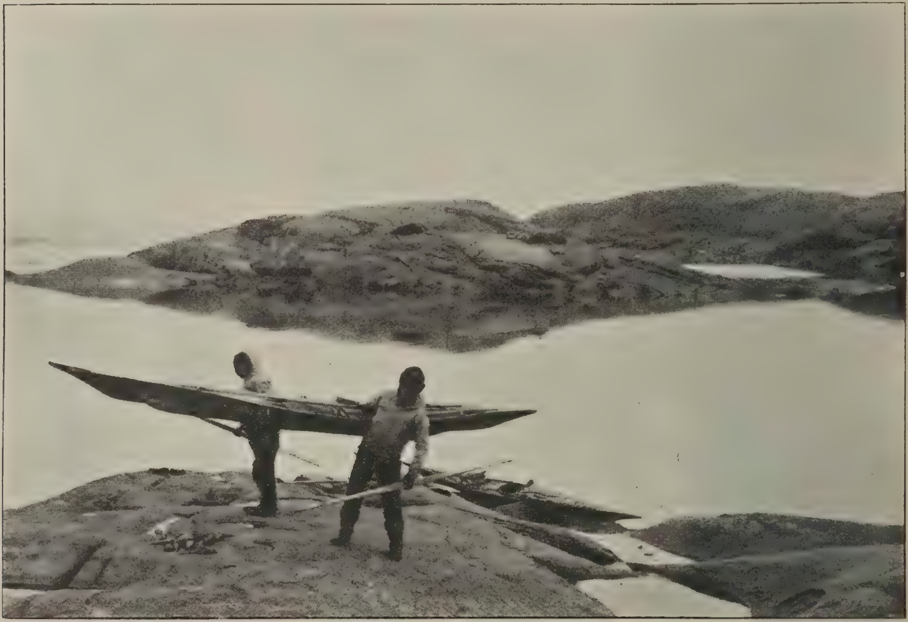

Fig. 23. The kayaks are launched.

It is, however, my travelling companion, Mr. Johan Petersen, to whom the chief honour is due for the excellent terms on which we were with the Eskimos. Born himself in Greenland, in the very part in which we were staying, he had so much natural authority among the natives, so intimate a knowledge of their peculiarities, and such warm and humane feelings for them, that the various difficulties, which of course did not fail to appear, were lightly conquered.

Our position was by no means quite easy. Any Dane staying in

Greenland must feel his responsibility. In his relations with the Eskimos, he must always be something of a teacher, and he must know that he may in all good faith happen to sow a seed of dragon's teeth. It is of decisive importance to the Eskimos to remain sealhunters and to learn to respect themselves as such. Their whole existence is dependent on the seal, it procures to them light and heat, food, clothes, everything. But day-labour has great attractions for them because it secures to them ready money in greater abundance and, in contrast to the hunter's life, provides them with a sure daily income.

Outside our part of the shore we saw drifting past us every day the ice-pack where the seal is chiefly found throughout the summer, and far out we could just see the Kitsigsut Islets to which a large portion of the population emigrate at this time of the year to concentrate their energies on the great summerhunt by which they lay in stores for the whole of the long winter. Weather and ice-conditions being favourable, we could not well keep back our men, indeed, it was our duty to call upon all able-bodied men to join in the hunt. On the other hand, we should be badly off if we kept only cripples or idle fellows for our work. In August the situation became simpler, then the great hunt was over, and there was now an abundant offer of labour which we need not hesitate about accepting.

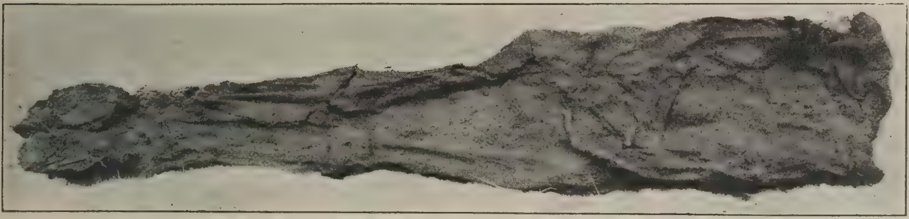

Fig. 24. Shroud No. 63 immediately after the uncovering.

As stated above we began our work with five men from Nanortalik who worked steadily and in good spirits the first fortnight. But soon they began to be homesick, and for that there was no remedy. We tried to improve matters by inviting their wives down to them, but, as perhaps might have been foreseen, this only bred dissension, and we had to send most of them home. In their stead we engaged fresh men from the settlements in the vicinity, especially from the former Moravian mission station Frederiksdal (Narssaq) situated on the opposite bank and just visible in clear weather from Ikigait. These people as a rule returned to their homes at night, and it was a fine sight to see the whole band of them (7 or 8 men) approaching in their little light kayaks in the morning.

Ikigait itself is not inhabited in our day. There were ruins of Eskimo houses and of the Norse settlements, and everywhere we found Eskimo graves by the Norse ruins. But now the headland lies desolate and abandoned. Nervertheless I do not remember having had, at any excavation in Denmark, such a numerous or interested crowd of spectators as in this deserted spot, and there were not many of the inhabitants of the southern settlements who did not pay us a shorter or longer visit in the course of the summer. Almost every day kayaks glided quietly into the bay, and umiaks packed with women and children besides meat, invaded us on their return from the summer hunting stations. When the meat had been spread out to dry on the bare rocks, their first interest was not, however, directed towards us — it must be admitted. They ascended the mountains and gathered angelica which grew abundantly along the streams, a very refreshing and spicy food. But when they had satisfied their ravenous hunger for vegetables which they had not tasted since last summer, and got over the stomach-ache which no doubt seldom failed to follow, their curiosity was diverted to us and our strange undertaking, and they provided us with welcome entertainment during our work. They were all well acquainted with the old churchyard, many of them had themselves found fragments of cloth at the water's edge, and we were told by one of the women that she had once carried some pieces home to make clothes for her children but after all they were not quite strong enough. A man thought that one evening he had seen a priest wearing a large hat, a ghost from the old Norse churchyard, sitting on one of the stones under the mountain. He looked puzzled and hurt when we were thoughtless enough to smile at his account.

On the extreme point of the headland our visitors put up their tents, if they did not simply content themselves with sleeping under the inverted umiak. As a rule they said they were leaving the next day, but this did not prevent them extending their visit over several weeks. They could not tear themselves away, and in Greenland time has not the importance that we ascribe to it. Many of the men felt inclined to lend us a hand now and then. Especially during the clearing of the church ruins and the uncovering of the dwelling-house and stables there was every occasion for them to try their strength in wrestling with the heavy boulders, and in this way several of them gradually drifted into our paid working-party.

During our entire stay at Ikigait the excavations had occupied us so fully that we had hardly had any time to make excursions in the neighbourhood. We had visited Frederiksdal and made a single excursion up the mountains, but that was all. Our work being done we would not, however, neglect the opportunity of a trip into the fiord of

Narssarmiut or Amitsuarssuk, the Norse Herjolfsfiord, at the mouth of which we had been staying. On the 29th an umiak came from Frederiksdal to fetch us, but violent torrents of rain made us postpone the excursion. The next day we could, however, start and reached the bottom of the narrower arm of the fiord, the Amitsuarssuk proper, from which there is a passage to Tasiussaq in the Tasermiutfiord (fig. 8), and where there is good salmon-fishing. Next day we visited Kangikitsoq, the second and shorter arm of the fiord, but in the afternoon when we were rowing out of the fiord, we met with strong head-winds and torrents of rain and only with difficulty reached Frederiksdal where we put up for the night in the deserted Moravian mission-house. The trifling archæological result of this little expedition has already been mentioned in chapter I. But quite apart from this, it was interesting to gain an impression of how sheltered and pleasant has been the life of the farmers in the interior of the fiords compared with that of Herjolf and his successors on the wind-blown headland.

We were now to start on our return journey. But the hard weather continued for another day and prevented our departure. The next morning — it was on the 2nd September — one of the usual south-easterly gales threatened, promising a fresh delay of three days. However, we contrived to man an umiak with resolute rowers, and as a further precaution, we were accompanied by an escort of two of the best kayakmen of the settlement. On our way we were to run into Ikigait to fetch our remaining equipment, but here the crew unexpectedly refused to continue the journey owing to the threatening weather.

It was a disagreeable situation. We had in reality no time to spare. There was a rumour from the north that a sailing-vessel had arrived at Julianehaab. We could thus count on a passage to Denmark within the immediate future, whereas months might pass before the next vessel arrived. On the other hand we could not judge of the weather outlook, and we had to pass a long stretch where it would be impossible to land should the storm come. After a rather sharp passage of words we plucked up courage and ordered our men to load the boat and start. By great good fortune the weather cleared, and towards evening we arrived at Nanortalik where we were to settle our account with the superintendent who had supplied us with various goods throughout the summer. In another umiak we now continued our journey northward, visiting on our way three hitherto unknown, or at any rate undescribed, Norse sites, viz. Igdlorssuit on the Sermersôq Island, Tunungasseq and Qunermiut on the northern side of the mouth of the Sermilikfiord. For some hours after we had left Nanortalik, the sun still shone warmly and brightly, but soon the rain began again and fell incessantly, and when on the second day we reached the outlying post Sydprøven, our rowers were wet through and so dejected that we found it necessary to call a halt for twenty-four hours that they might dry their clothes.

This delay proved fatal, for when we finally reached Julianehaab on the morning of September 7th, the sailing vessel "Nordlyset" had left for Copenhagen the day before, after having long waited for a fair wind.

It was a great disappointment, and we were rather at a loss what to do. As, however, it was rumoured — and in Greenland one has to rely on rumours with regard to the arrival and departure of vessels — that a cryolite boat might possibly be expected at Ivigtut in September, we at once resolved to set out on the long journey to this place, after having first visited the well-known church ruin at Qaqortoq. Unfortunately there was no motorboat to be had at Julianehaab so we had to continue at the slow pace of the umiak, but when we stopped at Qagsimiut to change boats and crews, we were overtaken by supervisor Ph. Rosendahl on his way to Ivigtut in his motorboat. He kindly took us onboard.

On the 13th of September, the second day after, we reached Ivigtut, but there was no vessel in the harbour, and as day by day passed, it became more and more certain that none was coming in that month. So we settled down for the time being, and during the long waiting time we were guests at the house of the supervisor where we were entertained with the greatest hospitality.

So far then we had no cause for complaint. In the supervisor's motorboat we had the opportunity of reconnoitring the surrounding fiords, and found several unknown Norse sites that will complete Captain Daniel Bruun's description of the ruins in this district in MoGr. LVI. In the Cryolite Mining Company's boat we even made a journey as far south as the Imartuneq- and Sermilik-fiords north of Qagsimiut. Nevertheless we were longing to get home. When October came, we began to look forward to the arrival of the last vessel which generally comes before the 10th of October, but the 10th arrived and several days after that and no "Fox II" appeared. Winter had come long ago, it was cold clear weather with the thermometer at 10°C. below zero. The snow already lay high.

Finally, one early morning, the 16th of October, we were awakened by the steam whistle of "Fox II" which was shortly after seen approaching on the fiord behind the last bend. The voyage up had been hard and lasted 21 days, but our voyage home was to exceed it both in difficulty and duration. We left Greenland on October 29th in a dead calm and bright sunshine. But already off Cape Farewell the autumnal gales began to toss us, and they hardly left us in peace till we reached the Skagerak. We had then almost run out of coals, and our fare began to be monotonous. After a voyage of 26 days we cast anchor in Copenhagen on November 24th. Our entire expedition had taken 6 months and 10 days. Our actual work extended only over 2 months. The rest of the time was employed in travelling and waiting.

The special conditions of the excavation at Ikigait necessitated the invention of special methods for the exhumation and conservation of the finds, particularly of the woven materials. The excavation work itself was thus distributed that the Eskimos removed the upper layers of earth until the interments began to appear or until the frozen bottom put a stop to the digging for the time being. Then I myself uncovered the finds with a small shovel while the Eskimos were sent to another part of the ground. Smaller objects and crosses could as a rule be taken up at once, but the coffins alone took much time. Most of them were very fragile and could only be uncovered with the greatest caution. Far more difficult, however, was the uncovering of the costumes which all lay directly in the earth and would hardly bear touching in their saturated, recently thawed condition. Sometimes the earth could be rinsed away, sometimes it had to be removed with the shovel. In certain cases the uncovering of an entire costume took a whole day's persistent work — but then I continued digging in my dreams through the night. The costume once uncovered, it had to be taken up, and that was an even more difficult task. The wet material was just as heavy as it was frail and could not carry its own weight, it was necessary to push something under it to serve as a substratum. The best and most cautious method as experience proved, was to unroll sacking under the costume and lift it thereon.

The next difficulty was the keeping of the costumes. It was now the middle of the summer and not until the autumn, several months hence, could we expect to be in Copenhagen. There could be no question of any actual conservation on the spot. I tried to clean the earth off the material by rinsing it thoroughly but it could not be done. I tried drying it slowly, but then the threads burst and crumbled away. The only thing to be done was to keep the material in the same damp condition in which it was found and guard it as much as possible from contact until it could be dealt with in the laboratory of the National Museum at Copenhagen.

We had brought with us from Copenhagen three very large tin boxes in which we had intended to deposit the finds for fear the saliferous humidity of the ship's hold should affect them. But with objects of this kind and in this condition humidity would be no danger. Quite apart from the fact that the tin boxes could not hold the very numerous objects, they proved quite unsuitable. We tried keeping a few pieces of cloth therein but they soon became coated with mildew. This experiment gave rise to a small incident. The boxes were placed in the Eskimos' tent, and now and again the large tin surfaces would expand and emit a hollow sound. This noise one night frightened one of our workmen, a very superstitious old fellow, who thought it was the dead rumbling inside to protest against our treatment of them. He was as white as a sheet in the morning, and it was only with difficulty we could make him accept the true explanation, but it must be said to the praise of the others that they all smiled at his timidity.

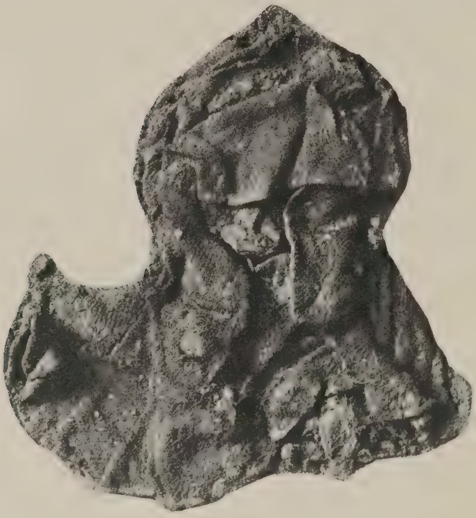
Fig. 25. Hood No. 71 before conservation.

However, the tin boxes being useless, we sent to Nanortalik for boards from which we made up cases adapted to the size of the costumes. But how were we to pack them so that they lay firm and could not dry? And we had to deal not only with the costumes but with the numerous wooden objects that came to light, and would split if they began to dry.

It was a serious problem and of course the possibilities were not very numerous in such a desolate and remote part of the globe. To begin with grass, heather, and sea weed were the equally unsuitable alternatives, but then our difficulties were fortunately solved in the most satisfactory way. The beds of the numerous little rivers carrying the melted snow down the mountain side were over long stretches overgrown with very thick quite saturated moss which could be peeled off in large flakes. This moss possessed all the properties we required. It was firm, yet soft, and very slow-drying, and it was present in almost unlimited quantities. When the objects were temporarily laid on the grass, we covered them with it, and later on we used it as a packing material in the cases, where it lay firmly pressed down on the objects and kept them damp without preventing the access of air. Thanks to this, on unpacking we found all the objects in exactly the same condition in which they were laid down, despite the fact that three months had passed between the dispatch of the cases from Ikigait and their arrival in Copenhagen.

A protracted, troublesome, and rather unpleasant task now lay in store for us at the Museum. About 18 months passed before the conservation of the entire find was accomplished. The wooden objects were treated with alum or glycerine and caused no special difficulties. As regards the costumes it was a fortunate circumstance that the conservation of one of the Danish oak-coffin finds, abt. 3000 years old, containing a female dress from the Bronze Age, had just been accomplished, so that Mr. ROSENBERG, the principal preserver at the Museum, had been able to elaborate quite modern methods of conservation for such frail woollen materials. Under the supervision of Mr. Rosenberg the entire conservation work was entrusted to Mr. J. RAKLEV to whom the chief honour for the very satisfactory result is due. His technical skill and dexterity and not least his unlimited patience and tenacity saved several pieces which would have been doomed to destruction in less careful hands.

In itself the process of conservation was very simple. First the clothing was immersed in water, lying on the sacking on which it had been taken up. Here it remained for some days in order to dissolve the various foreign substances that had become entangled among the threads, such as rootfibres, and especially deposits from the decayed body clinging to the material. After the rinsing was finished, the stuff was slowly dried, and was then subjected to a kind of massage cure, being laid on a table and then treated with the fingertips to remove all foreign particles. This was the most important part of the conservation work, and also the most troublesome part, and when it was accomplished, the material had regained its old elasticity, and, in an astonishing degree, its original strength. A backing of tulle was affixed to the more dilapidated parts, whereupon all the material was treated with a beticol preparation.

The conservation work itself was now finished and the careful restoring of the costumes to the original shape only remained. This work could only be done by a woman. Valuable assistance was here given, to begin with by Miss SIGNE MYGDAL, deputy keeper at "Dansk Folkemuseum", a connoisseur in the early methods of weaving who has made the study of national dress her speciality. It proved, however, a lengthy and troublesome task which Mrs. M. RAKLEV kindly undertook and has carried out with the greatest care and skill. Tears and bad places had to be mended, seams that had ravelled out had to be sown again, and almost all the pieces suitable for exhibition had to be sown on to a lining before they could be hung on the stands. It was, however, not a question of manual work only. Several of the costumes had been cut up to serve as shrouds, some had only survived through the centuries in a very dilapidated state, and often after rinsing and conservation we had merely a heap of loose rags before us which were to be brought into the right relation to each other.

Chapter III.

The Buildings at Herjolfsnes.

Seen from the high mountain above, the broad forked headland of Herjolfsnes with the narrow isthmus at its base calls to mind a hand stretched out in welcome to the ships approaching land, or warding off the too aggressive sea. But the sea has taken no notice of this gesture, year after year it has beaten against the shore washing away the low grassclad land, not least at the most vulnerable point by the "wrist". Here the wealthy farmer at Herjolfsnes built a church and laid out a churchyard round it, perhaps in the vain hope that the divine powers would then protect the place. In the preceding pages (chap. I), however, we have told what happened. In 1830, when Herjolfsnes was re-discovered, the dead bones projected from the slope above the sea; the lower (southern) wall of the churchyard had fallen into the sea, and from what the Eskimos said, it had apparently happened long before. At that time, however, there was still abt. 12—13 m. of land from the southern church-wall to the edge of the slope, but in 1919, when Governor O. Bendixen visited the place, the slope ran immediately below the church-wall, the whole of the intermediate ground being swallowed up by the sea which had even begun to encroach upon the south-west corner of the church, and in 1921 its ravages extended still further.

A. The Church and Churchyard.

The early Greenlanders surrounded their churchyard with a stone-set enclosure consisting on the north side of very large stones and having a breadth of from 1.5 to 2 m. On the east and west sides it is of a somewhat different character, the stones being fewer and much smaller. It may here most appropriately be characterised as an earth-wall, the interior of which is stayed by stones. The churchyard forms a square with unequal sides, the west and east sides diverging very much from each other so that the south side must have been considerably longer than the north side which is 26 m. long.[1] There is only 4.5—6 m. from the church to the northern wall of the enclosure, while there has at any rate been more than the 12—13 m. that have disappeared since 1840, from the church to the southern wall. Consequently it is seen that the church was situated on one side of the churchyard, and it is further seen that it was by far the largest half of the churchyard that had disappeared before the final archæological excavation took place.

On his sketch map of 1840 Kielsen shows an entry abt. 1.5 m. wide in the north side of the churchyard wall abt. 8 m. from the north-west corner.[2] It would have been a most likely place for an entrance-gate, but in 1921 we found no traces of it. It is true, we could find no other place where the entrance could have been, so the question must be left unsolved. The wall has crumbled and fallen in over great stretches.

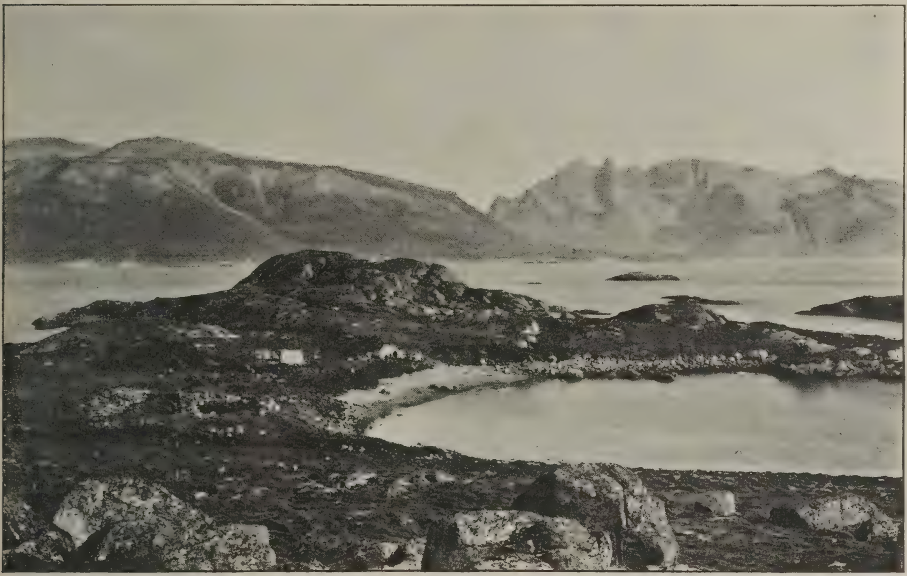

Fig. 26. Herjolfsnes.

At the head of the deep creek in the foreground are the ruins of the church.

The church was built of granite stones and earth (turf) without mortar or clay to bind them. The walls are preserved to a height of three courses above the deep and very broad foundations. The stones employed are all un-dressed, and not even split stones occur, but the facing-stones are carefully chosen with large even surfaces, and looking along the well preserved north wall (fig. 33) there is only one irregularity to be seen, due to the later blocking up of the small doorway in the middle of this wall. It is, however, only the outer side of the wall that is built of such choice material, the inner surface is much more uneven and has possibly been covered with boards. On the other hand, greater stress has evidently been laid on regular courses on the inside than on the outside face.

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[1] The remaining part of the west wall has about the same length.

[2] See the copy of Kielsen's sketch in GHM. III, pl. IV.

The walls vary conspicuously in thickness, especially in the chancel, where the eastern gable is almost 3 m. thick, while the northern side-wall adjoining the nave is only a little over 1 m. and the gable of the nave is here only 50—60 cm. thick. More regular are the side walls of the nave where the north wall is 1.5 m. the south wall 2 m.

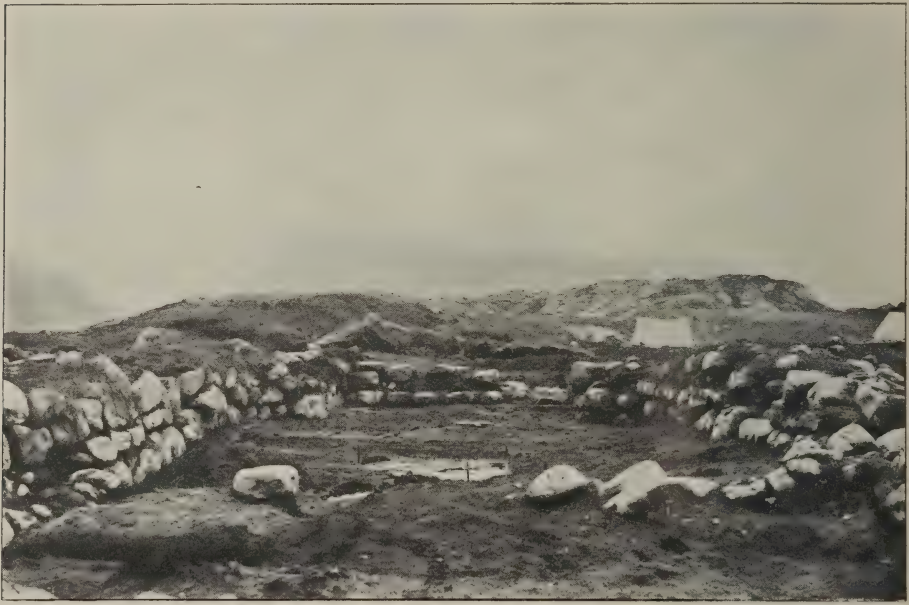

Fig. 27. The interior of the church from the West.
The stones in the foreground at the place of the gable are only débris without significance.

The church ruin was partly excavated by Kielsen in 1840. He, however, only found the side walls of the nave, and on the basis of his excavations he sketched the ground-plan of the church as an oblong rectangle. Since, however, none of the two gables was visible on the ground, it was with a special interest we began to search for them in 1921 while the interior of the church was being cleared of the great masses of débris that filled it. During this investigation it proved that neither of the two gables existed or had ever existed in the place assigned to them. To the east there had been a small rectangular chancel which has, however, been much spoilt by the Eskimos who had placed one of their huts across the east gable and employed the stones of it for building. The inside surfaces, it is true, are preserved to the height of a single course, but of the outer face only the north side with a couple of stones of the eastern gable were preserved in addition to one single stone on the south side nearest the nave. Otherwise only the foundation or — at the south-east corner — nothing at all remained. For the determination of the main dimensions of the church this is, however, of no importance.

At the west end there has been no stone-set gable at all. Presumably the gable has here been of boards, as we know it from Icelandic building,[1]) though it is not quite impossible that the gable was built of earth turf only.

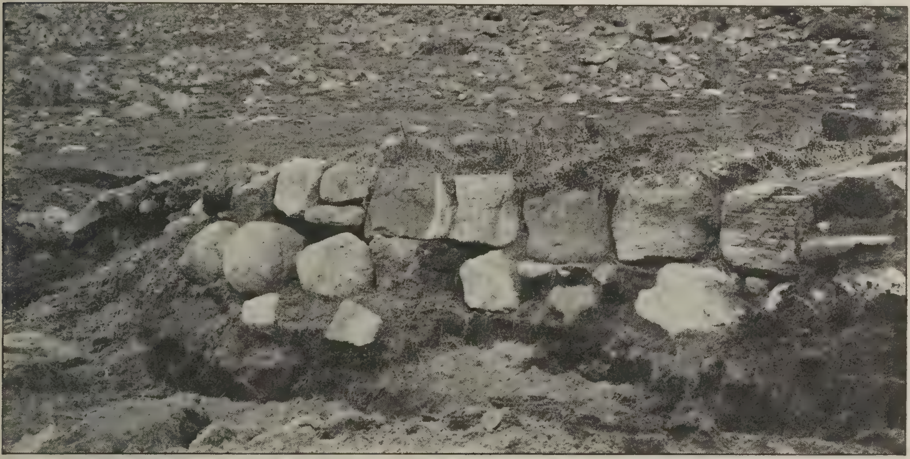

Fig. 28. The remaining portion of the southern churchwall with fine regular stones.

The total inside length of the church looking east and west has been abt. 14.5 m. of which the chancel is 3 m., the nave 11.5 m. The breadth of the chancel is 4.3 m., of the nave 6.5 m. The chancel has been open to the nave in its total breadth, there have not been any projecting jambs for the chancel arch, an arrangement which may be found elsewhere, especially if the chancel has a barrel vault.[2])

In the north wall of the nave there has been a small narrow doorway, 78 cm. in external breadth, but narrowing to only 56 cm. at the inner face. Outside before the doorway there are still two narrow flagstones showing marks of wear. This doorway is remarkably near the eastern end of the nave, being only 4.5 m. distant from it, while it is 7 m. distant from the western end. It had been blocked up and may for that reason not have been observed before. Perhaps it was done simultaneously with a rebuilding of the church which will be mentioned below.

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[1]) Cfr. Dan. Bruun, De sidste Græstørvkirker paa Island (Architekten V, p. 453 seq.) and the same author's The Icelandic Colonization of Greenland (MoGr. LVII, p. 5 seq.).

[2]) Compare e. g. the church at Egilsø (Orkneys), Dietrichson & Meyer, Monumenta Orcadica (1906) pl. XX and p. 96, further ANFB. 1904, pl. III, ibid. 1900 p. 252 & 255.

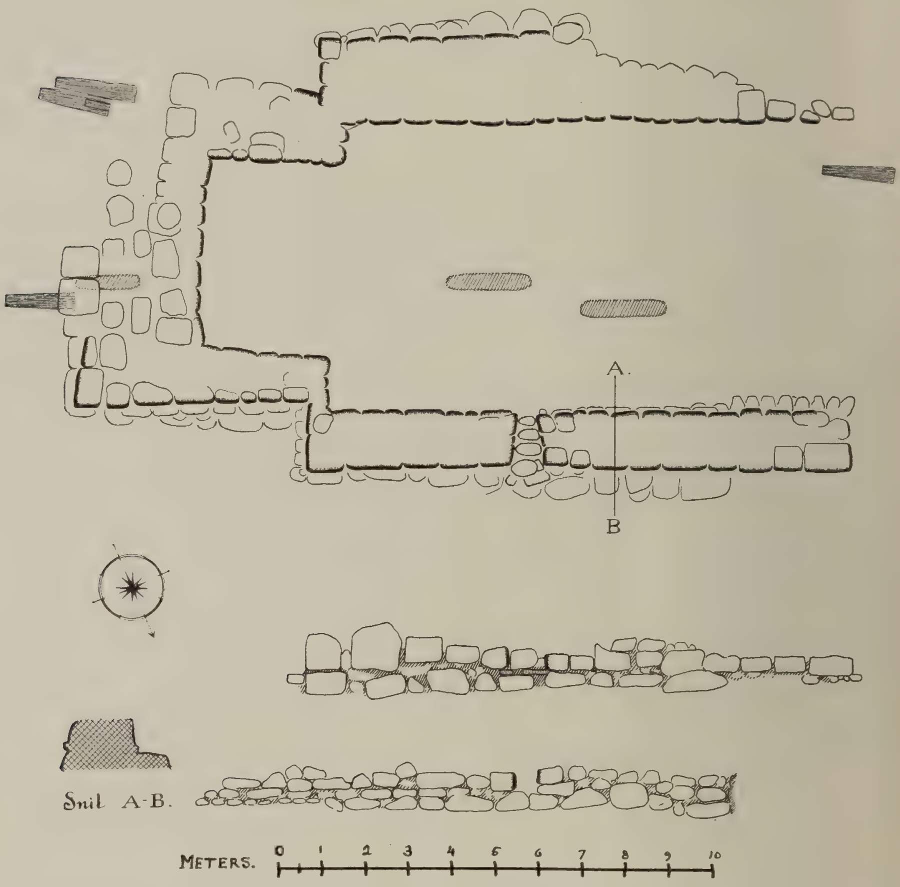

Fig. 29. Groundplan of the church-ruin.

Below elevations of the north wall of the nave, external and (at bottom) internal side. In the latter the stones blocking the doorway have been removed.

The north doorway faces the dwelling house of the farm and has thus been a convenient entrance for the inmates. Kielsen indicates another doorway in the south wall of the nave facing the sea, and this doorway reappears in later surveys of the ruins. It is the regular place for a church door and would be convenient for people coming by boat from the other settlements in the neighbourhood. But during our complete excavation of the ruin we found no slightest trace of it, and it is a fact often experienced — in Greenland more than elsewhere — that in incomplete excavations one will easily be deceived by débris. The outer part of the wall had certainly fallen into the sea in this place, but the doorway should have been apparent on the inner side of the wall. Hence it must be assumed that the main entrance to the church was in the western gable.

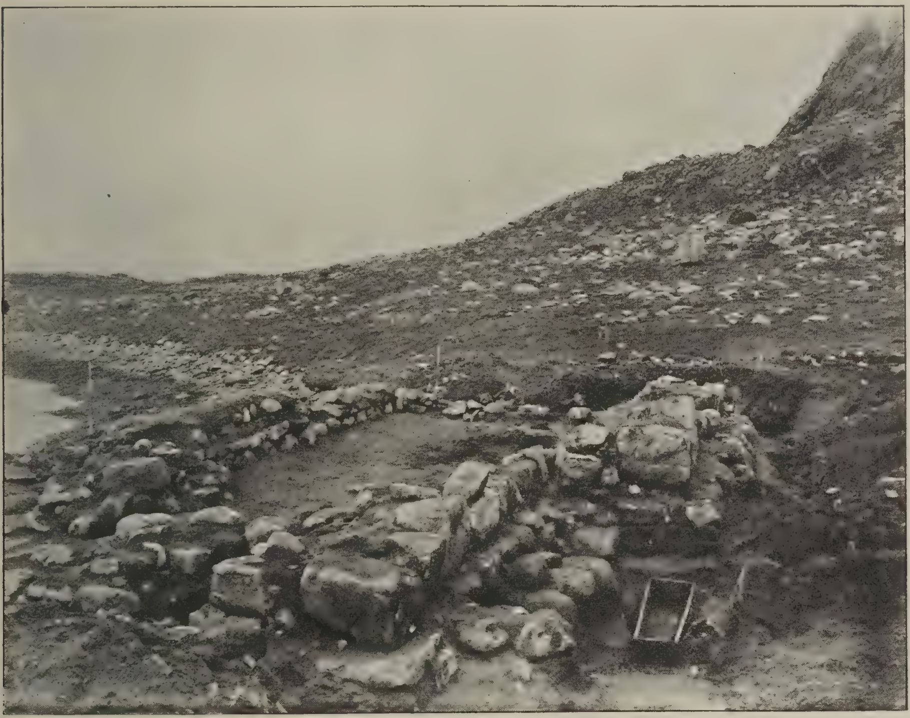

Fig. 30. The church-ruin viewed from N. E.

In the corner between nave and chancel an exhumed coffin (No. 30).

No traces of windows were found, nor has any pronounced window-stone been observed among the débris, so it cannot be decided whether there have been windows in the walls or whether light has been obtained through the roof. Nor can anything certain be said about the roofing of the church. But it may be assumed that the end-wall of the chancel and possibly the eastern end of the nave above their stone walls had a gable of vertical planks joined by groove and tongue. For during the excavations in the churchyard a small deal plank was found north of the chancel at a depth of 80 cm. or more below the old surface. It was 65 cm. long and abt. 11 cm. broad, wedgeshaped in transverse section, having a groove and a tongue at the long sides (fig. 31). This plank — No. 1 in the list of finds — has probably been part of the gable, the upper end having been sloped to be adjusted to the roof, while the lower end has fitted into a horizontal beam.

No certain traces of flooring were found in the church. However, at the extreme east end of the nave and in the chancel lay a couple of flat stones showing marks of wear which are probably the remainder of a floor. In that case it must have been almost on a level with the outside surface west of the church, while the threshold of the small blocked north doorway has lain at a somewhat higher level, which corresponds with the fact that the ground outside rises from west to east.

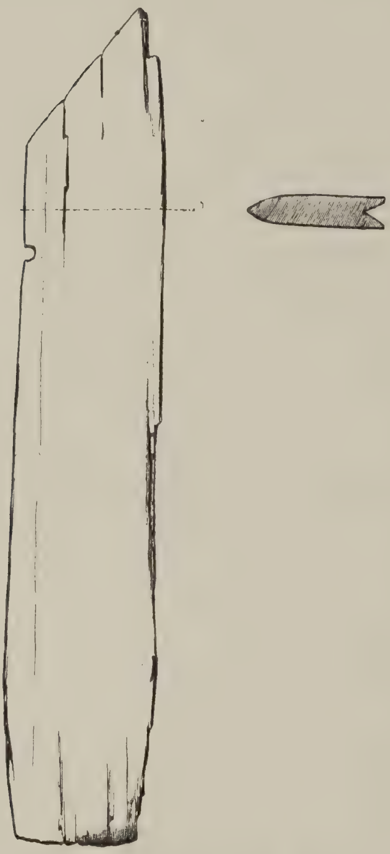

Fig. 31. A deal plank, probably from the chancel gable.
(abt. $^1/_3$ nat. size).

With regard to this church ruin two problems present themselves for discussion, firstly, whether it is the oldest church on the site, and secondly, whether it has been preserved in its original form or whether it has been subsequently rebuilt. These two questions will have to be dealt with connectedly.

Not the slightest actual trace of an older church has been found but, as shown in the ground-plan in fig. 29, interments have been ascertained both at the eastern and western ends of the building which cannot be reconciled with the present groundplan. In the first place we found an entirely decayed interment lying right under the foundations of the eastern gable of the chancel (to exhume it the outer foundation stones had to be removed), and in addition a very well preserved coffin (No. 26), the top-end of which was also covered by the foundation stones. These two burials must have taken place before the chancel gable was built, and the same is the case with two other coffins (Nos. 22 and 23) which were found at the north-eastern corner of the chancel.

There is, however, nothing to indicate that the chancel is a more recent addition to the nave, leaving out of consideration that it would be an unusual way of enlarging a church by adding to it a narrower chancel. It is true that the connection between chancel and nave is curiously slender and clumsy but all corners are regularly bonded, and if the church originally terminated at the east end of the nave, the gable wall, with the deep foundations employed for all the original walls, would have been traceable across the chancel. Of this, however, we found no slightest trace, and it may even be said with certainty that the ground in this place has never been dug up below floor-height. A reason for the exceedingly thick chancel gable might be conjectured, viz., that the wall had originally been thinner and had only subsequently been strengthened by additional masonry. To this, however, may be objected that no divide can be distinguished in the wall; the north side is exceedingly well preserved, and the foundation was uncovered in its entire, very considerable depth (fig. 30), but neither below nor above ground was there the slightest indication that the whole wall had not been built at one time.

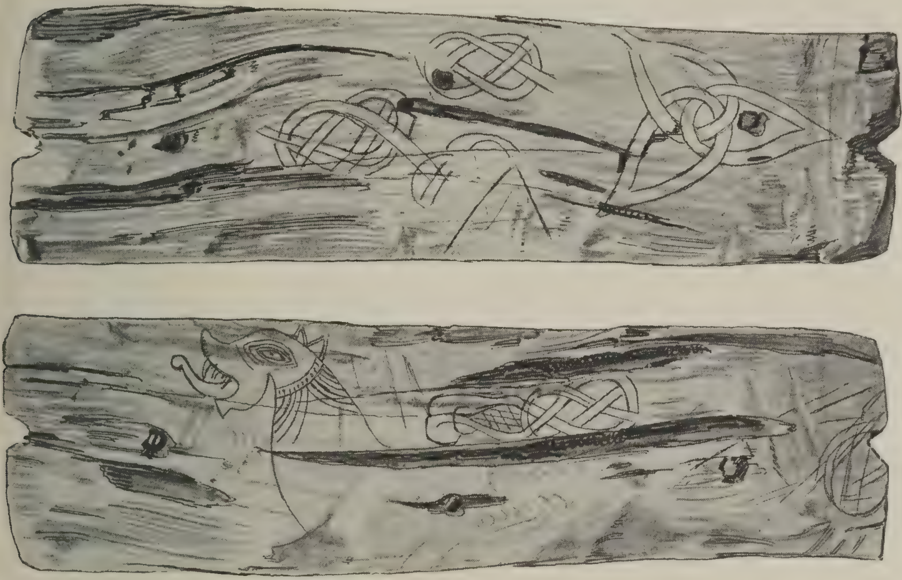

Fig. 32. Designs carved on the two sides of a board from coffin No. 26.

We may therefore consider it established that there has been a burial ground and consequently also a church in the same place before the present church. Despite the fact that we can find out nothing about this older church, the indication of its existence alone is very important.

The above-mentioned coffin No. 26, the top end of which was found covered by the foundation stones, was of interest in several respects. In the first place, like two other coffins, it was tied together with whalebone fibres, but its most remarkable features were the ornaments which had been carelessly incised on the upper half of the foot-piece (fig. 32), viz. a dragon's head, various fragments of scroll work without foliage and a triquetra-like design consisting, however, of three independent figures. Most characteristic is the dragon's head which differs from the usual Romanesque form of dragon's or lion's heads which was generally adopted in the Scandinavian countries, too, in the course of the 12th century. With its distinctive protracted muzzle and large oblong eye it belongs to the late off-shoots of pre-Romanesque art. It may be compared with a dragon's head on a pastoral staff of ivory in the National Museum at Copenhagen (fig. 33 a) which, according to an old tradition, originates from Sorø Abbey and has belonged to Bishop Absalon (d. 1201). At any rate it dates from his time or is very little later. The Greenland dragon's head, too, probably dates from the close of the 12th century. This date would correspond well with the rest of the ornamentation. Of course we can never be sure how long a style may persist in so remote a place, and further it must be borne in mind that the ornament was not carved specially for the coffin, but is of earlier date, the coffin having been made up of wood that had been used before.

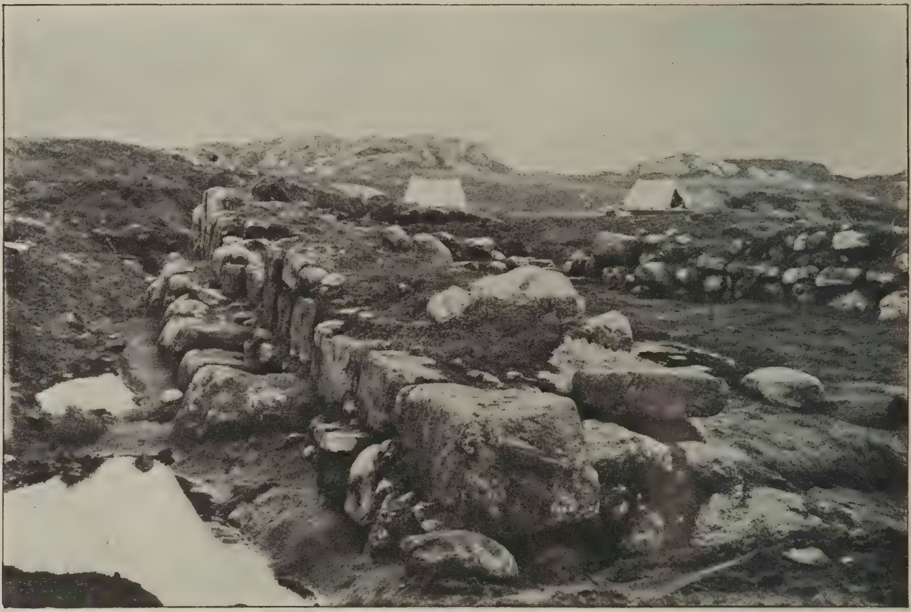

Fig. 33. North wall of the nave, viewed from the West.

This being so, we cannot by these means attain to an absolute fixed date either for the church or the coffin and its ornaments, but by their mutual relationship their dates may be fixed with tolerable certainty. The church is of later date than the coffin, but much later it cannot be, since nearly all the other interments in its immediate vicinity were evidently still later and were placed in relation to it. The coffin antedates the church but cannot at any rate be earlier than abt. 1150. All things considered it may perhaps be assumed that the coffin has been deposited in the grave some time during the 12th century or in the beginning of the 13th century, and that the church was built soon after.

We now proceed to the west end of the church. Here we found a coffin (No. 3 in the list of finds) having one half inside, the other half outside the external flush line of the west gable.[1] In this case, however, the coffin need not necessarily be assumed to antedate the church. It is more probable that the coffin originally stood outside the church but that the latter at some not definitely established date was lengthened towards the west.

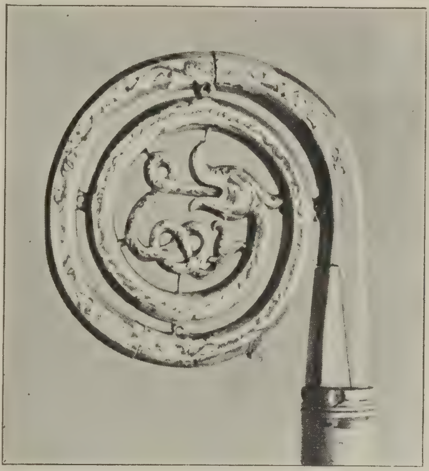

Fig. 33 a. A pastoral staff from Sorø, abt. 1200.

(National Museum, Copenhagen).

Fig. 34 shows in the foreground the western end of the north wall of the nave, seen from the outside (from the north). Here it may be quite clearly observed that the four western stones of the wall (in all abt. 2.75 m.) have only a quite superficial foundation of small stones in sharp contrast to conditions further east (see also fig. 33 where the contrast between the foundation of the original wall and that of the added piece is quite plain). The same contrast is observable on the inner side of the wall where a row of small and more superficially placed foundation stones in the westernmost part projects beyond the rest of the foundation (see groundplan of the church and the two elevations of the north wall, fig. 29).

If then the inside length of the nave was originally only abt. 9 m., the small north doorway would in that case have been in the middle of the side wall of the nave, and this would correspond better with the usual custom. We might then assume that the door had been blocked up simultaneously with the extension, it being now too far to the east.

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[1] Though the western end of the south wall is missing, we have full certainty of the place of the west end, the north wall being well preserved, especially the external corner-stone.

Hence the process of development at Herjolfsnes is as follows. A church was built, probably shortly after the settlement, but was superseded abt. 1200 or a little later by the present church to which was subsequently added an extension towards the west.

Among the church ruins hitherto examined in the old Greenland colonies the church at Herjolfsnes shows close relationship with the cathedral at Gardar as it appeared before its transepts were added.[1]) This considerably more impressive church, which was built of blocks of red sandstone laid in clay, had also originally a narrower chancel, while the other known churches are simply rectangular. But even more significant is perhaps the fact that no trace of a west gable of stone has been found in the cathedral, nor does any such seem to be ascertainable in the church ruin at Qagssiarssuk in the Igalikofiord, the Norse "undir Høfdi."[2]) This, then, is a similar case to what we found in the church at Herjolfsnes.

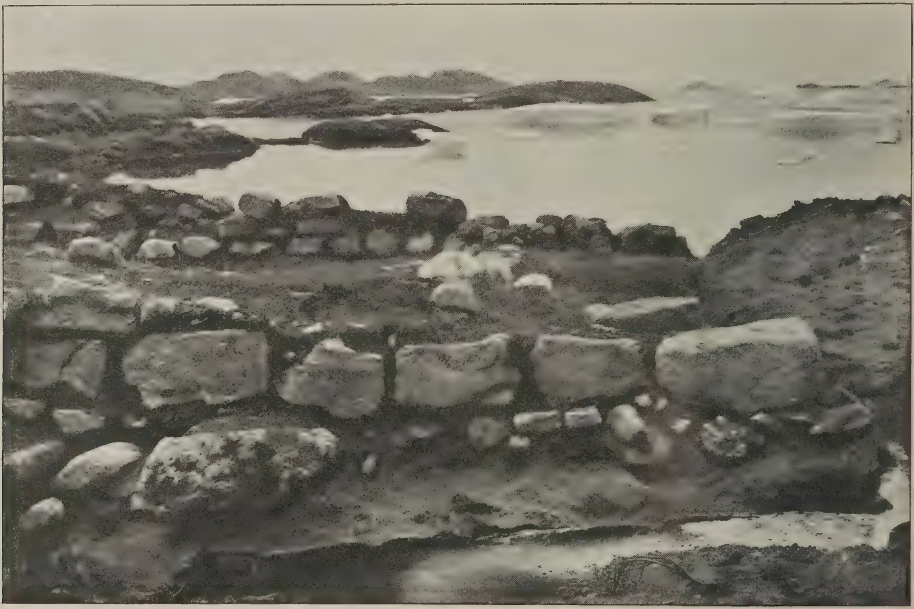

Fig. 34. North wall of the nave. The outside of the western end.

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[1]) See Daniel Bruun in MoGr. XVI p. 323. M. Clemmensen, ibid. XLVII p. 326. H. M. Schirmer in ANFB. 1904, p. 123, Biskopskirken paa Garde, Grønland.

[2]) Clemmensen, l. c. p. 344.

The corresponding groundplans[1]) of the cathedral and the church at Herjolfsnes point to a certain synchronism. It is most probable to suppose that the cathedral was erected shortly after the foundation of the bishopric. The first bishop, Erik Gnupsson Upse, came to the country in 1112, but it is doubtful whether any firm organisation of the diocese was attained until under his successor Arnald who arrived in 1126. If we assume the cathedral to have been built in the middle or at the close of the 12th century, we reach a point of time only slightly antedating that assumed for the erection of the church at Herjolfsnes.[2])

Among the church ruins of the eastern settlement known up to the present, the church at Herjolfsnes is the third in size. Its area is abt. 86 sq. m. while that of the cathedral before the addition of the transepts was abt. 154 sq. m., and that of the church at Brattahlid (Eric the Red's farm and after him the usual abode of the law-speaker) abt. 131 sq. m. The Qaqortoq- or Hvalseyarfjardar church was 67.5 sq. m. and Qagssiarssuk or "undir Høfdi" 62 sq. m. The relative sizes of these churches confirm the impression we gain from the historical tradition, that among the settlements in Greenland Herjolfsnes was only surpassed in importance by Gardar and Brattahlid.

On the whole it must be said that the churches in Greenland were astonishingly large. H. M. Schirmer states that the cathedral at Gardar was only 6 feet shorter than the Olavschurch at Nidaros,[3]) and about the church at Herjolfsnes it may be said that it was more spacious than many a church built simultaneously in the Scandinavian countries though it stood by an isolated farm and was only frequented by people from the southernmost sparsely populated fiords.[4]) The churches which most naturally invite comparison, the early Icelandic turf-churches, were considerably smaller.[5])

B. The Dwelling-House.

North of the churchyard the ground rises evenly, and over a stretch of several hundred meters there is or has formerly been a vigorous growth of grass. Most of the stones have been cleared away here, but an actual enclosed farmyard *(tún)* is not to be found.

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[1]) Whether or not the cathedral had any projecting wall between the chancel and the nave, cannot now be ascertained.

[2]) In his interesting investigation of the church ruins in the Julianehaab district Mogens Clemmensen has advanced the theory that the type represented by the two above-described churches is of later date than the simply rectangular groundplan chiefly represented by the churches of Brattahlid and Hvalsey (l. c. p. 315 seq.). Future excavations and investigations will probably give rise to a renewed discussion of this difficult question.

[3]) ANFB. 1904 p. 125.

[4]) The most densely populated fiord in the southern part of the eastern settlement, the Ketilsfiord or Tasermiut had itself no less than two churches.

[5]) Dan. Bruun in Architekten V, p. 453. Cederschiöld in AfnO. 1887 p. 50.

Going northwards from the church across this grass-covered ground, one comes upon one after the other of the farm-buildings that are still preserved. First comes the dwelling-house. Unfortunately we cannot give much information about it. The brief time at our disposal after the termination of our investigations in the churchyard did not suffice for actual excavations, and the walls lay too deep for mere trenching to be of any avail.

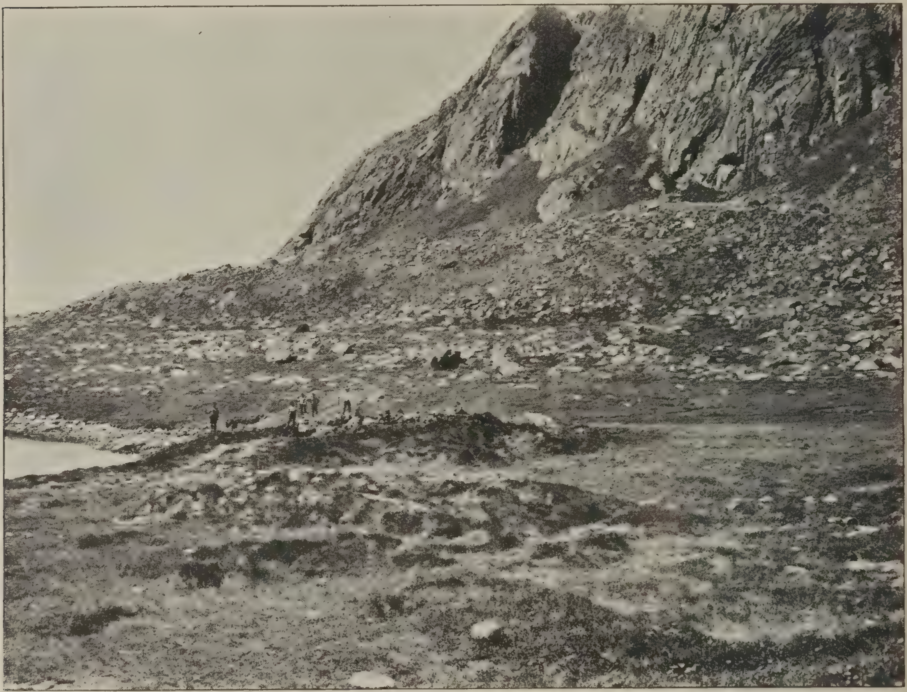

Fig. 35. Herjolfsnes churchyard and the surrounding homefield viewed from the East.

The buildings are not placed due east-west like the church, but face south-east owing to the nature of the ground. The various parts are very unequal and date from different periods. Of greatest interest is the south-western portion which contains an independent building that seems earlier than the adjoining walls and is at any rate more solidly built.

The best preserved north-eastern end of this building was excavated by Kielsen in 1840,[1] and we concluded his work, though there was no time for an entirely satisfactory archæological excavation. The main digging was done along the inside walls, only small portions of the outside being uncovered, chiefly to ascertain the thickness. The corners of the house have long been employed for Eskimo graves. In the eastern corner there was a grave containing ten skulls, and

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[1] Ann. f. nord. Oldk. 1842—43 p. 337.

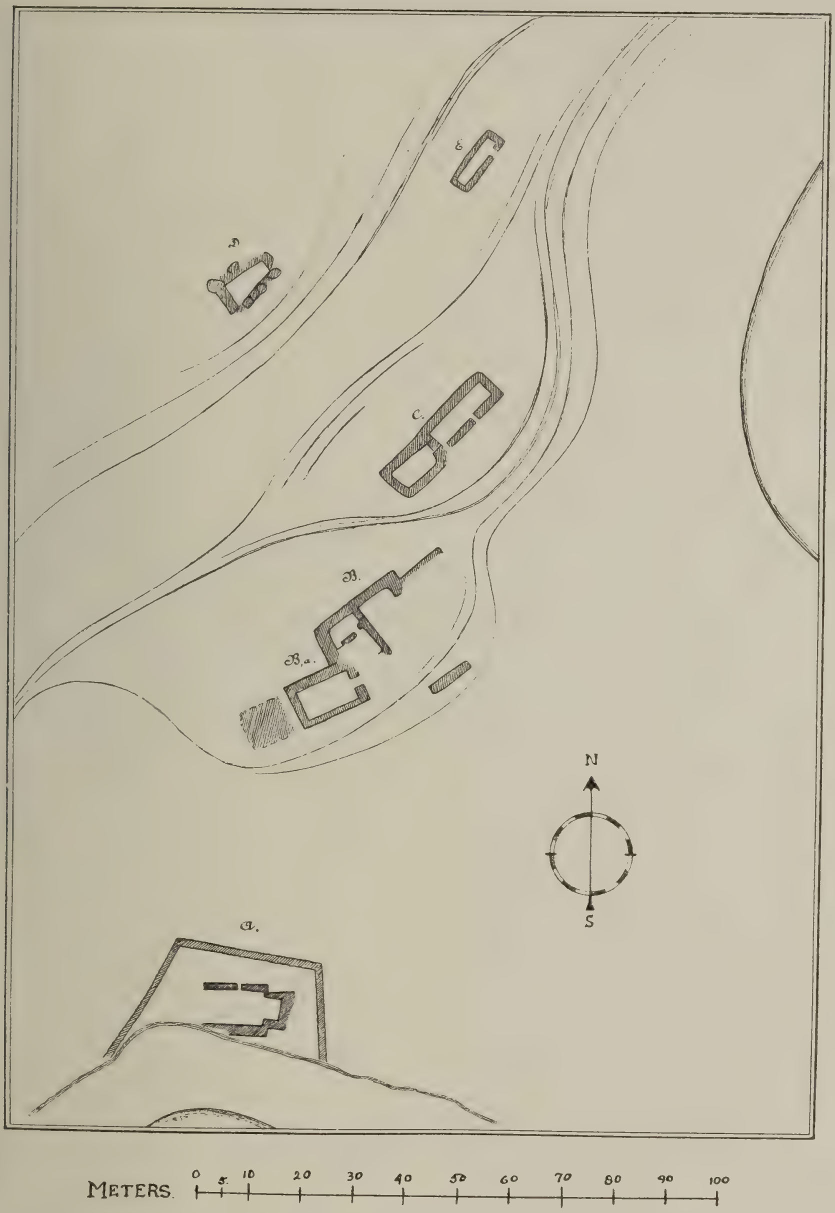

Fig. 36. The church and farm buildings at Herjolfsnes. Ground-plan in abt. $^1/_{1500}$.
A. Church and churchyard. B. Dwelling-house. C. Stable. D-E. Outhouses.

a couple of soapstone lamps were found in sunken graves in the southern corner.

This building is remarkable by being of rather better and more careful construction than the church. The material is the same — large, unhewn, but very choice granite-stones, almost squarestone-like.[1] They are carefully fitted together but without quite regular courses. In contrast to the church the inner side of the walls has here been most carefully treated. The most remarkable feature about the masonry is, however, that the stones have been laid in clay, while in the church walls the interstices were simply filled up with earth or turf. The clay is very plentiful despite the fact that it had to be fetched from a great distance. As far as we could learn, it is not found any nearer than the Marraq Bay (i. e. the Clay Bay) which is abt. 3—4 km. distant in the direction of Igdlokasik. Clay was occasionally used for mortar by the Norse settlers in Greenland, but only for the grander buildings such as the cathedral at Gardar.[2]

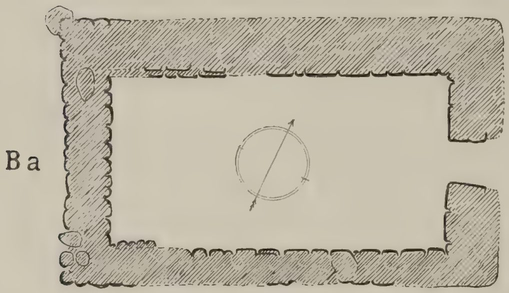

Fig. 37. A wing of the dwelling-house. (abt. $^1/_{250}$).

Inside the building is almost the same length but somewhat narrower than the nave of the church, viz. 11 m. long and 5.5—5.75 m. broad. The walls are of very unequal thickness, in some places only 1.25 m., but more often considerably thicker (1.75—1.85 m.). At the south-western end the walls are somewhat sunken and not so regular as at the other end. Outside the gable, in the depths of the foundation lay a thick layer of dung and ashes with an intermixture of wood and sticks. Here we found a small shard of brownish Rhenish 15th century-stoneware (list of finds No. 168). It lay at such a considerable depth compared with the building that it cannot date from the last Norse period at Herjolfsnes, and the small, insignificant fragment has therefore its great importance as a means of determining the date when the settlement was abandoned.

In continuation of this end of the building is found a piece of ground with great masses of partly large stones which do not seem to be derived from walls but rather to have been laid down to ensure dry ground outside the house.

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[1] In other parts of Greenland e. g. at Qaqortoq and at Igaliko (Gardar) there are regular buildingstones in plenty, but at Herjolfsnes it must have been a laborious task to procure choice material.

[2] Lime (shell-lime) is only known to have been used in one building, viz. the church at Qaqortoq.

In the centre of the opposite, north-eastern gable, facing the rest of the buildings, is a doorway, 1.35 m. wide at the inside and rather wider at the outside. The jambs are made of fine large regular stones, only two at each side despite the fact that the wall is 1.75 m. thick. The two outside stones have unfortunately been removed. At the entrance, however, lay three lintels, also very large and regular stones, the longest only little under 2 m. The floor of the building is made of thin flat stones laid in clay like the walls.

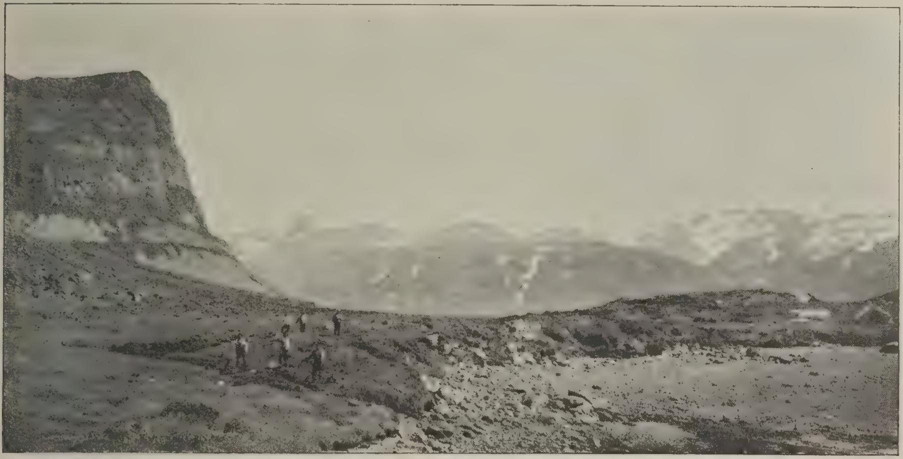

Fig. 38. The ground at Herjolfsnes viewed from S. W. The churchyard and the homefield.
The figures in the foreground are standing in the churchyard.

It seems reasonable to assume that this house, to which so much labour and good material have been given, must have been used for purposes of corresponding importance. As it does not seem to have been divided by transverse walls, it must, in the circumstances, have been a very spacious hall, perhaps a "banqueting hall" where the foreign traders were received on their arrival. But it cannot have been in this hall that the sibyl Thorbjørg was received by Thorkel when Thorbjørn of Løgarbrekka visited the farm in the beginning of the 11th century (see p. 9). The before-mentioned potsherd found at the foundations of the end-wall seems to indicate that the building originates from more recent centuries.

Of even later date are the adjacent parts of the dwelling-house, having quite evidently been built up against its northern corner. The walls uncovered in the main part of the building lay mostly at the same depth as the large hall, but they were built of different material, turf and stones without any use of clay. Pure turf-walls were not found, but the stones were as a rule smaller and played a less conspicuous part than in the walls of the church, for instance. For the rest, beyond what the plan shows (fig. 36), there is not much to be said about the few and fragmentary walls we uncovered. The lowermost wall, which must no doubt have been connected with the rest of the buildings, but was covered with an enormous quantity of débris, must have been thicker than the other walls and was built of very large stones.

Under the long wall running opposite the entrance-gable of the first-mentioned wing of the building lay some timber partly bearing marks of tools, and in between were large pieces of whalebone. Though the timber was not very heavy it is very likely remains of an earlier building which stood on the same spot.

C. The Stable.

A short distance north of the dwelling-house stands a narrow lengthy building facing south-east, probably a stable. It consists of two sections measuring together abt. 25 m. inside length. The north-eastern part which was excavated by Kielsen in 1840, was later on inhabited by Eskimos, who added one of their usual long tunnels before the entrance and, considering the space too large for a room, built a partition a little to the left of the doorway. This cross-wall was only of smaller stones.

This part of the building, which is probably earliest, is the most solidly and regularly built. The walls are abt. 1.85 m. thick and constructed of stone and earth (turf), rather like a casing filled in with earth. Here, too, the inner sides are the most carefully treated, and it is doubtful whether the stones on the outside have constituted the surface — more probably they have been covered by an earthen wall, at any rate on the side facing the mountain.

The inside of this earlier building must have been abt. 13.3 m. long and 3.5—3.7 m. broad. On one side of the front is a narrow doorway, the outside corners of which are formed of two very large stones. Its width is only 60 cm. at the inside, 80 cm. on the outside.

Later on the building has been extended towards the southwest, a broad opening being simultaneously made in the gable wall, the more exact dimensions of which cannot, however, be determined. The addition is more irregular in plan. Its length is abt. 9.4 m., its breadth 4—5 m. The walls are only 1.35 m. thick, and the stones employed are smaller than in the older house, but the construction is the same. While in the older house two or three courses have been preserved, only the foundation stones remain here, and one or two courses in part of the back-wall.

The addition may possibly have had a doorway in front abt. 3 m. from the gable of the older building, but conditions were too disturbed for us to arrive at a certain result whithout more elaborate excavations.

The breadth of the building both in its earlier and later part corresponds to what was common for cowhouses throughout North Europe and to what has often been ascertained in similar stable-buildings among the ruins in Greenland, thus both at Brattahlid and Gardar.[1] Sheep- and goat-stables, on the other hand, were only 2.5—3 m. broad. Despite the very limited space the cows have presumably stood in two rows down the long sides of the building, their tails towards each other. When the stock was complete the cattle have no doubt been as closely packed as sardines in a tin.[2]

One half of the stable-buildings is supposed to have been frequently used as a hay-barn, but this cannot have been the case in this stable where the walls are constructed of turf and stones, while in hay-barns they are built of stones only, to ensure ventilation. It is, however, probable that the two outhouses D and E have been used as store-houses for the stable-fodder.

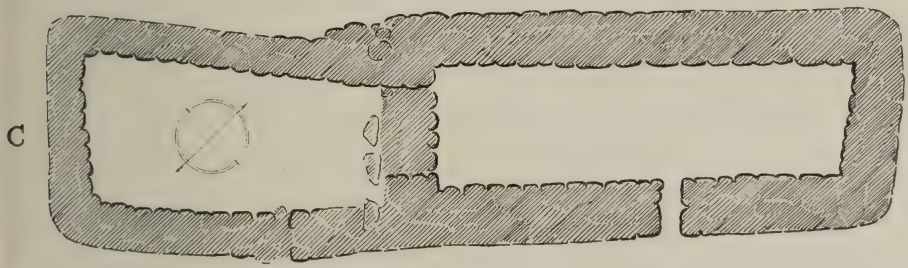

Fig. 39. The stable.
(abt. 1/250).

D—E. Outhouses.

The two northernmost ruins situated some way up the mountain-slope are outhouses built exclusively of stone without earth or anything else to give coherency, the rock forming sometimes a component in the construction. This is especially the case with the lower side (the front) of D. Entrances could not be made out in any of them. D is 9 m. long inside measure and abt. 4 m. broad, while E is longer and narrower, being 10 m. long and 2.25 m. broad.

This concludes our survey of what is now found of medieval sites at Herjolfsnes. It is, however, hardly credible that the large farm should not have comprised more buildings. Thus we miss the large enclosures (sheepfolds) which are as a rule never wanting on any large Norse farm. We must assume that the Eskimos, who later on lived on the headland through long periods, and had many huts especially near the shore, took their building-material from the Norse houses, as they do to this day when they live on old Norse sites (thus at Igaliko, the site of the old cathedral). In that way more than one ruin may have been done away with, and the Norsemen may further have had buildings along those parts of the shore which have now been washed away by the sea.

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[1] D. Bruun in MoGr. XVI, p. 293 and 327 comp. pp. 344, 363.

[2] Comp. D. Bruun, The Icelandic Colonization of Greenland p. 164.

Chapter IV.

Burials and Burial Customs.

The total find exhumed at Herjolfsnes cemetery in 1921 comprises relics of abt. 110—120 different burials. In addition there was, however, especially in the upper layers, a considerable number of burials in such a bad state of preservation that no part of them could be taken up; often, indeed, they were so decomposed that their presence could only just be ascertained as a clay-like layer in the gravelly soil. Roughly speaking I should say that about 200 burials were ascertained in the part inspected, and it must be borne in mind that only the smaller and inferior northern half of the churchyard was preserved, the shore being now immediately below the south wall of the nave which had already begun to collapse, while only at the far end to the east by the chancel a piece of the southern side of the churchyard had been preserved. From the Middle Ages right down to our own day the southern side of a churchyard has always been preferred, and this was most probably the case, too, among the old Norse settlers in Greenland. That, at any rate, seems to be indicated by the fact that only very few burials were found in the entire area north of the nave, and most of these quite close to the church, where the place under "the eaves" was always most eagerly coveted.

As will be seen in our map of the finds, they may be divided into three main groups, one in the western part of the churchyard, the other in the north-east corner, and the third on a small strip of ground south of the chancel. Within these areas the burials were generally very closely packed, often in three or even four layers under each other. The north-east corner beyond comparison yielded the richest result. There a series of the best preserved costumes was found on the two last days of digging, lying layer below layer. Most closely packed were perhaps the burials south of the chancel, but here they were less well preserved though found at considerable depths. In the course of time when the sea encroached upon the land, they came to lie so close to the seashore that the surrounding strata became subject to fluctuations of temperature (thaws in the summer) and were gradually desiccated.

On the narrow strip between the eastern gable of the chancel and the churchyard wall only few burials had been preserved, but there must have been many more. When decomposition had progressed further here than elsewhere, even at considerable depths, this must presumably be because in more recent times an Eskimo hut was built here, the heat from which was no doubt transmitted far down into the soil.

The church itself has only very rarely been used for burials, the Norse settlers at Herjolfsnes being in this respect in more strict accord with the stringent rules of the Church than with the general custom in Europe. There have never been any burials in the chancel, and only two in the nave, one in the middle, the other slightly to the north-west of it. Both will be mentioned below on account of their remarkable contents.

The dead were either buried in a wooden coffin or wrapped in their old clothes, only rarely in both. The shroud must be understood as a substitute for a coffin. Not a single coffin built of stone was found, which must be denoted as a highly peculiar circumstance since such stone-lined graves were very common in Europe and would have been much easier to procure than the wooden coffins, not least in a land where the lack of timber was balanced by an abundant supply of natural stones in all shapes and sizes. Not even the medieval custom, so common in Scandinavia, and perhaps also elsewhere in Europe, of placing a couple of stones on end at the head, was observed.

If we are to take the shroud as a substitute for the coffin, we must conclude that coffin-burial was preferred by those who could afford it. That this was actually so is very clearly evidenced by the distribution of the coffins and shrouds (see map of the finds). For the most part the coffins are closely packed round the walls of the church where the most coveted burial-places were. More especially we found them in great number on the small strip south of the chancel, no doubt the most distinguished place of all. In the out-of-the-way corners of the churchyard there were no coffins, but here some of the best preserved shrouds were found. A comparison between the wooden crosses found in the coffins and those found with the shrouds points in the same direction. The latter are absolutely inferior in execution to the former.¹)

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¹) Crosses were found in one-fourth of the coffins (7 out of 29) but only with one-eleventh of the shrouds (4 out of 45), but, as mentioned below, this may be due to the fact that the shrouds belong to the later part of the find, for it is not improbable that the crosses were less frequently used in more recent times.

On the other hand, it is no sign of a special or lamentable poverty, not even of a special lack of timber, that the dead were thus often swathed in clothes and buried without a coffin. For ordinary people this was the common mode of burial in Europe from antiquity to the 17th century,[1]) we only know so little about it because generally such burials were not able to survive.

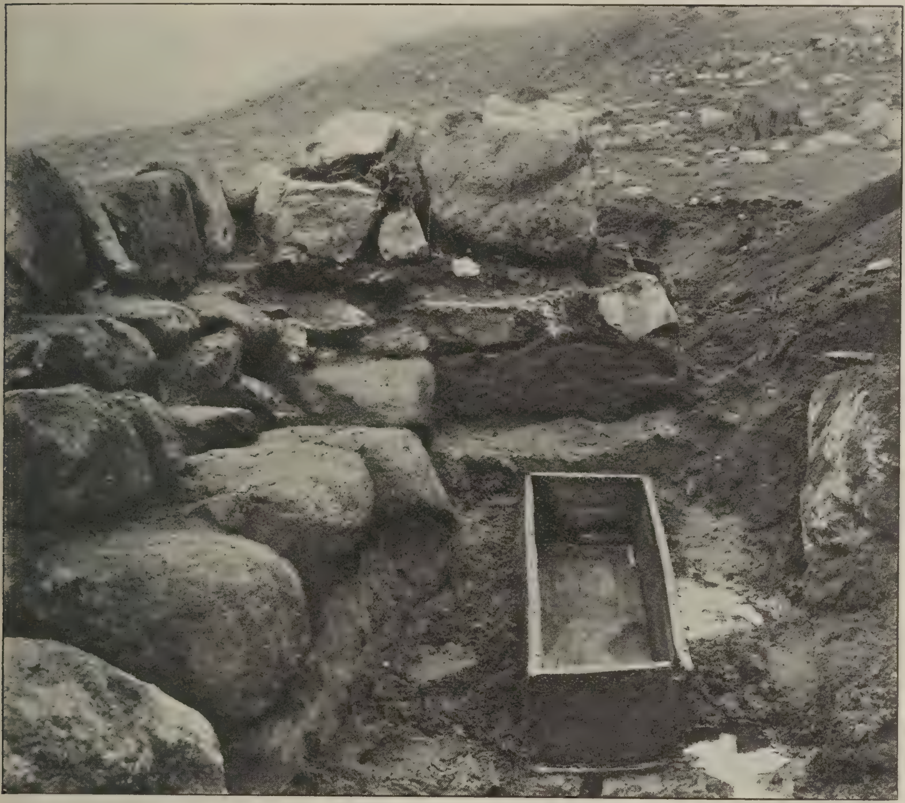

Fig. 40. Coffin No. 30 after exhumation.
In the corner Gudveg's rune-stick.

From the description of the coffins in chapter V it will be seen that several of them were found without a lid. This does not mean that they never had any, but that they have been used several times. We know of similar cases from Europe where brick-built tombs were used several times at short intervals even for the burial of distinguished persons.[1]) When the second corpse was laid in the coffin, there was, perhaps, no room left for the lid, or it may have been broken by the pressure of the earth and removed without being replaced by a new one. In coffin No. 30 there were at any rate unmistakable traces of two corpses while the nail-holes for the missing lid are still seen in the edges of the coffin.

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[1]) Proceed. Cambridge Antiq. Soc. vol. XII, No. 50, p. 251 (1908) cfr. vol. XIV, No. 55, p. 38 (1909). Proceed. Antiq. Scotland 5, 98 seq. 1889—90, p. 388. O. Doering, Deutschlands mittelalt. Kunstdenkmäler als Geschichtsquelle. p. 298: — Leute aus dem Volke erhielten höchstens hölzerne Särge, wenn sie nicht, wie bis ins späteste Mittelalter hinein, einfach ohne solche lediglich in Tücher gehüllt begraben wurden.

This coffin is of so much interest in various ways that we shall here give some connected account of it (fig. 40). Close to the north wall of the nave lay a very heavy block of granite. It was too large to have constituted part of the wall, and for a long time I thought that it must have lain there from time immemorial, the Greenlanders of old having saved themselves the trouble of moving it when the site was taken for a churchyard. Its weight was abt. $1^1/_2$ tons. It was a great surprise, then, to discover a coffin under it, as well preserved as if it had been recently placed there. The whole of our working party, consisting then of eight men, now set to work to roll away the stone, but it could be moved neither by hand-power nor jemmy, and finally we had to dig a trench by the side of it and remove the earth from under it till it fell into the trench. We contrived to do this without damaging the coffin, (which is now safely lodged in the National Museum at Copenhagen), and could then carefully begin emptying it of earth. As usual, the corpse was entirely decomposed, and there was no trace of a shroud or similar wrappings. Only at the western end we found in two places a yellowish substance which, taught by experience, we concluded to be brain-substance, thus inferring, as we said above, that there had been two corpses in the coffin. It was only when we got down to the bottom that a surprise awaited us. In one of the corners of the top-end lay a small wooden stick with very distinct, almost inconceivably well preserved runes inscribed on it.

This inscription, of which Professor Finnur Jónsson gives the interpretation in a subsequent section, is in the Norse tongue and runs as follows: "*This woman was laid overboard in the Greenland Sea, who was named Gudveg*". It appears, then, that a woman had died on the long voyage to Greenland and her body been lowered into the sea,[2]) then, upon the vessel's arrival in the harbour at Herjolfsnes, the little stick was carved in memory of her, laid in a coffin and buried in the churchyard as an actual representative of her. We can hardly find any other explanation that will meet the case.

The Eskimo Hansesôk, our faithful assistant during the digging, who first discovered the coffin, requested that it might be named after him. But this could not be done, its name was given, it must be "Gudveg's cenotaph". It is true that, in the long run the coffin did not, strictly speaking, remain a cenotaph, and it is probable, though less romantic, that it was not actually made for the rune-stick but for a body which was to be buried at the time and with which the stick was then laid. Only so much is certain that the stick, which lay firmly against the bottom without any particle of earth or gravel between, must have been in the coffin from the beginning.

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[1]) See e. g. Script. Rerum Danicarum IV, p. 541. List of tombs in Sorö conventual church, Seeland.

[2]) Like that of Thorgil in the song of Skjald-Helge, GHM. II p. 501.

Subsequently, when the coffin was utilised for the last time, the lid was removed and the huge boulder of granite rolled on to the grave instead. That this laborious task was not undertaken without some definite object in view, is a matter of course. We may imagine two possibilities. Either it was done as a safeguard against ghosts from the grave,[1] or to secure undisturbed peace in the grave to the dead person.[2] It is difficult to say which explanation should be preferred.

The dead person was laid in the grave in Christian wise with his head towards the west in order that he might look towards the rising sun when he rose on the Day of Judgment. In one case we thought we had met with an exception to this rule, the hood No. 66 lying with the head pointing east. This was explained after our return, however, when the hood was opened and found to contain bones of the legs. It had been used to swathe the legs of the corpse the liripipe being wound round it (fig. 41), and the general rule was thus confirmed in this case, too.

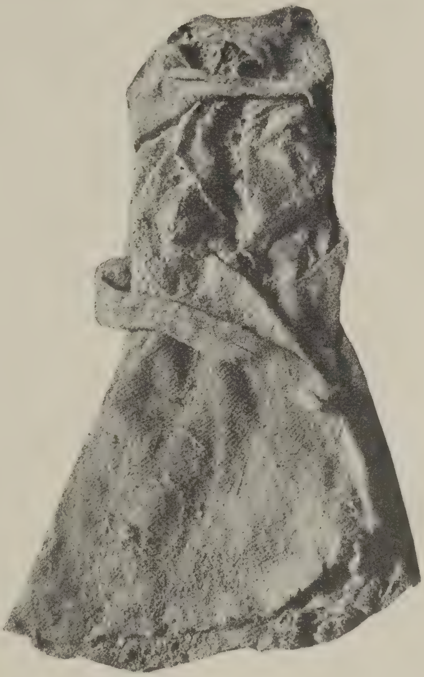

Fig. 41. Hood No. 66, as it was found.

On the whole it must be said that the Christian burial customs have been very faithfully observed and the dead just as carefully attended to as in Europe. Even infants were shown the last honour of burial in consecrated ground. Of the thirty-one coffins described below no less than fourteen are children's coffins, and eight of these are only between 43 and 55 cm. long. As a new-born child generally measures abt. 50 cm., seven of these coffins must have enclosed tiny babies, and when a small coffin for a child, having a breadth of only 8 cm., was found on the top of the coffin of an adult (No. 23), it does not require any great stretch of the imagination to picture to oneself a young mother who died in childbed and was followed in the grave by her new-born babe.

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[1] Comp. Floamanna-saga 13, GHM. II, p. 52: "Ødun said, we will put the coffin into the earth and then lay on it a weight as heavy as possible" (ok bera à hana sem mestan þúnga).

[2] Comp. the Scotch mortsafes, Proceed. Soc. Antiq. Scotland 1910—1911, p. 295.

The old Norsemen had the strongest belief in the magic power of the cross, and placed this sign everywhere. It is found on utensils, even on the simplest weight-stones for the loom, and we found it repeated, again and again, on a piece of leather which had presumably formed a primitive foot-wear (No. 94 and fig. 132 below). But the grave was naturally the place where this ancient Christian symbol was most frequently in use. It is carved on the few tomb-stones known from Herjolfsnes, but above all, mention must be made of the small carved wooden crosses accompanying the dead, which were laid either on the coffin or directly on the breast of the body, in a few cases concealed on the naked breast under the shroud.

These crosses will be described in more detail in a subsequent chapter. Here we shall only deal with the custom of using them for the graves. This custom may be shown to have existed in Europe from the early Middle Ages down to our own day. In graves centuries earlier and later than Eric the Red we often find, both in France and Great Britain, small leaden crosses, sometimes with formulas of absolution incised whence they derive their name of absolution-crosses. They are known for instance from Metz,¹) from Angers,²) and from Bouteilles by Dieppe,³) as well as from Lincoln⁴) and London,⁵) and in some places they have been in use far down into the late Middle Ages. Curiously enough, similar crosses do not seem to have been found in other parts of Europe, and they are not known from Scandinavia.⁶) Nevertheless

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¹) Bergner, Kirchliche Kunstalterthümer p. 337 seq.

²) Now in the Musée St. Jean. One was found under the head, the other on the breast of a skeleton.

³) Proceed. Soc. Ant. London 1. ser. IV, p. 84.

⁴) Catalogue of the Museum of Antiquities exhibited at the annual meeting of the Archæol. Institute, held at Lincoln, July 1848, p. 20.

⁵) Proceed. Soc. Ant. London 1. ser. III, p. 165 (1855), from the cemetery of Bury St. Edmonds. 2. ser. XXI. 1. 12 (1905), from the cemetery of the Grey Friars' monastery. See also Proceed. Soc. Ant. Scotland 5. 98 seq. and, about a Limoges crucifix found in a churchyard at a depth of 3 feet, ibid. 1882—83, p. 146.

⁶) Note, however, a steatite cross with peg, 56 cm. long, found in Ullensvang church. ANFB. 1889, p. 56.

there can hardly be any doubt that the same custom was observed here, and if crosses of wood were employed, it is easy to understand that they have perished. It is at any rate known to have been the custom among the peasantry of the Danish Isles down to our day, to place three crosses of straw on the shroud, one on the breast, the other on the abdomen, and a third one at the feet, or a single cross only was laid on the breast.[1] There is no reason to doubt that this custom

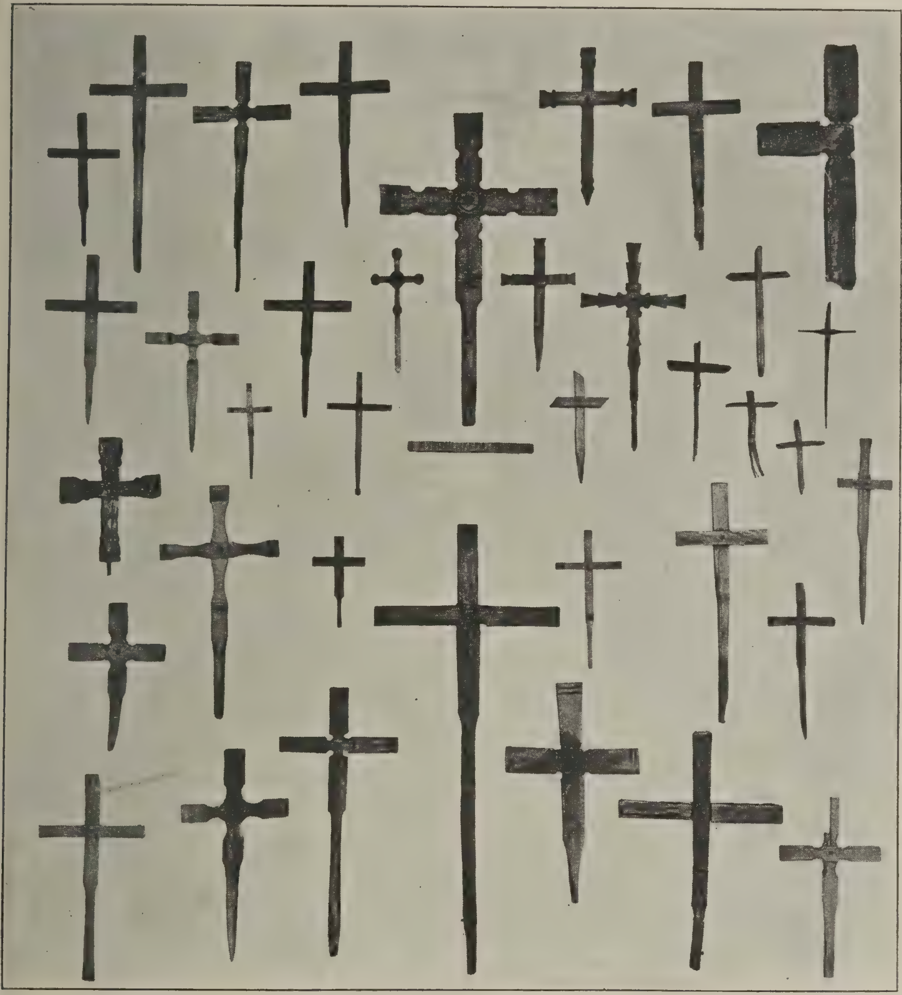

Fig. 42. Crosses exhumed in the churchyard.

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[1] See, e. g. Lars Andersen, Folkeliv i Odsherred p. 99. Chr. Olsen in Historiske Aarbøger for Holbæk Amt XVI (1922) p. 95. District physician J. S. Møller, the keeper of the museum at Kalundborg, has had occasion to note this custom himself, and I am indebted to him for drawing my attention to it.

dates from the Middle Ages, whatever may have been the material then employed.

However, it was by no means in all the graves at Herjolfsnes cemetery that such crosses were found. There, as in Europe, an easier way had in many cases been resorted to, the arms of the body or the sleeves of the shroud being simply crossed (see fig. 43). It deserves mention, too, that like the coffins, the crosses could be used more than once. In two of them, Nos. 140 and 150, it is plainly seen that one limb is derived from an older cross which has been repaired. It is, however, a problem whether the custom of letting the dead be accompanied by a cross in the grave was observed during the entire period of the Norse settlement or whether it may be shown to date particularly from the earlier or later part.

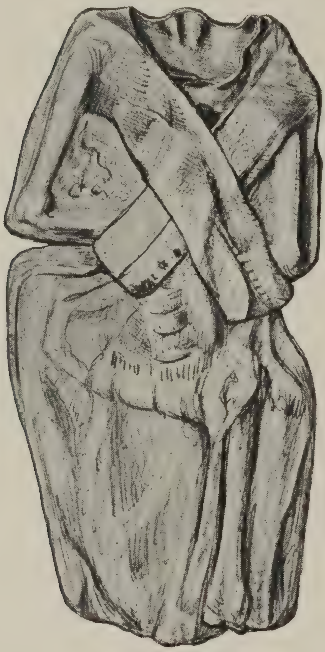
Fig. 43. Dress No. 41 as it was found.

We may, I think, safely assume that the custom, as such, was known and observed throughout the entire period. On the one hand, one of the most popular types of cross, the type having semicircular hollows at the intersection, points to traditions of great antiquity, as we shall show in chapter VIII. This type must undoubtedly be traced to the British Isles where, from the numerous stone crosses preserved, it is seen to have been in extensive use during the centuries previous to and immediately after the year 1000. Thence it spread to Norway and — with or without the intermediary link of this country — to Greenland. Here this type of cross may of course have survived long after it had been abandoned elsewhere, but it must have been adopted early, at the latest in the 12th century.

On the other hand, a cross was found with one of the latest of the costumes (No. 64) which cannot date from an earlier period than the beginning of the 15th century; hence, at so late a period, the custom had not become extinct. It is true, this cross was of the simplest, being formed merely by splitting a stick stripped of the bark and inserting another stick in the cleft,[1] and altogether crosses were found with only 4 out of a total of abt. 45 costumes or fragments of costumes, while out of abt. 50 crosses found in 1921 no less than three-fourths were found quite alone without any remains of the buried, they being no doubt among the oldest specimens of the find. This would seem to indicate that the custom, though still observed, became more and more rare, or it "degenerated" in the way so common in the case of such customs, the crosses being more and more carelessly made. We may perhaps say that typologically these simplified Greenland crosses represent a stage on the road towards the 19th century straw crosses of the Danish peasantry.

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[1] Also another of the 5 split crosses, No. 159, is among the few crosses found with a shroud.

There is another element in the relation of dresses and crosses speaking even more forcibly in favour of a gradual discontinuance of the use of absolution crosses. We refer to the fact that only in one case was a cross found in layers above costumes (No. 160), but in several cases in layers below such. The six crosses numbered 119, 129, 134, 141, 145 and 151 were all found under hoods, while No. 137 was found under a dress and cap. Since these hoods to which we shall subsequently return, cannot be older than the close of the 14th century, while, on the other hand, the crosses bearing runic inscriptions, which are the only ones that can be approximately dated, are referred by Professor Jónsson to the beginning of the same century, the circumstances of the find confirm our assumption that, generally spoken, the crosses belong to the older part, the costumes to the younger part of the find.

We now turn to an entirely different burial custom. In European stone coffins and brick-built graves, especially those prior to 1300, we very commonly find small pots of charcoal and incense placed mostly near the head of the corpse. Such "incense pots" never occurred at Herjolfsnes. We were, however, struck by the fact that whenever we approached a burial during digging, we were, as it were, notified of its presence by a greater or smaller amount of charcoal strewn in the layer above, especially over the head and breast. Involuntarily we thought that a fire must have been lighted on the grave before the closing of it, but most probably the explanation is given by Durandus, one of the greatest authorities on medieval church ritual. In his *Rationale divinorum officiorum* it is stated in the part dealing with funeral rites[1]) that holy water should be sprinkled in graves to drive away the demons, while incense should be placed there to remove the death-scent, and coal to show that this spot could not be used for secular purposes any more. For coal, he says, will keep longer than any other substance that could be left as a testimony. Hence, the Greenland priest who performed the funeral ceremony was guilty of no degeneration to paganism, on the contrary he kept strictly to the rules of the Church.

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[1]) Rationale divin. offic. liber VII, cap. 35, 38. Beleth, Explicatio divin. offic. cap. CLXI de celebratione mortuorum officii.

According to Christian views it was not necessary, as in pagan times, to furnish the dead with worldly goods or implements in the grave, the cross alone would help them on their way. It is, however, a well-known fact that, even in Europe, such objects were often put in the coffin for superstitious reasons. In the graves at Herjolfsnes cemetery in addition to the crosses, we only found very few objects deserving mention in this connection.

In disturbed burial-layers north of the church lay a weaver's knife or diminutive sword of wood, neatly tooled (No. 189). We cannot well suppose that it could get into so deep a layer as to be preserved without having originally belonged to a burial. It is possible, then, that a woman was furnished with weaving implements as in pagan times. Several stone whorls were also found in the churchyard, but so near the surface that they have perhaps merely been accidentally dropped there.

Of greater interest are the two only graves found inside the church, one situated in the middle of the nave, the other somewhat further to the north-west. In neither of them were there any traces of a coffin or shroud, and only the faintest reminiscences of the body itself. In one of them, however, in addition to two copper pins and some small pointed wooden sticks serving most probably to fasten the shroud, was found a bear's tooth which could hardly have been anything but a charm.

In the other was found, on a level with the belt, a small object of the shape of the pommel of a dagger for which it may possibly have served despite its being of wood. The original pommel of iron or brass may have been lost and for want of other material it may have been replaced in this way. That the rest of the weapon, which must have been of iron, rusted away entirely in the damp earth is no wonder. More remarkable even was another find made in the same grave. Under the head lay an oval box, the sides of which were formed of whalebone while the bottom was of deal. This box, which is the only object showing relationship to Eskimo culture, contained a yellowish mass which, according to Professor BILLE GRAM's microscopic examination, consisted of animal tissue and dried blood, and there appears to be no other explanation than that the box contained food for the dead person. Thus both of the graves from the church itself furnish their own peculiar contribution to the elucidation of the Norse burial customs.

Chapter V.

The Coffins.

In the preceding chapter we have seen that the people buried in coffins belonged on the whole to the more wealthy part of the small community, and had it been in the old pagan times when the dead were accompanied in their graves by an equipment corresponding to their wealth and social rank, we might have looked to these coffins in particular to furnish us with rich results. But in a Christian churchyard there was no such hope for the archæologist, and curiously enough, in that respect the coffins are, from an archæological point of view, the least interesting part of the find. In the first place the coffins themselves were mostly of uniform workmanship, and even the differences that occurred did not seem to lead to any chronological determination, either absolute or relative. And in the second place, the contents of the coffins were unexpectedly poor. With a small shovel we laboriously emptied the earth out of all the twenty-nine coffins layer after layer, in order not to damage anything, and in one after the other we reached the bottom without meeting with anything but earth. It must not be forgotten, however, that some of the best and most valuable wooden crosses were found in the coffins (see especially coffins Nos. 15 and 28),¹) and likewise the little stick inscribed with runes (in coffin No. 30). But only in one case, in the child's coffin No. 15, did we find a fragment of a dress,²) in none of the others was there the least indication of a shroud. Quite thin materials may possibly have been used, and they would in that case have become just as decomposed as the body itself of which in no case even a single bone has been preserved³).

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¹) Altogether 7, i. e. one-fourth of the coffins found in 1921, contained crosses or fragments of crosses. We also know that two crosses found on former occasions were found with coffins.

²) Also the fragments found by Dr. Meldorf (Nos. 57 and 75) were stated by him to have been found in a wooden coffin.

³) A cross sent in by Governor Holbøll in 1852 is, however, stated to have been found in a decayed coffin with human bones.

But it is quite possible that the dead may have been put naked into their coffins, and, as we have already remarked, the shrouds which were found directly in the earth — in nearly all cases upper garments of rather heavy material — must be considered as substitutes for coffins.

Of the 29 coffins examined at the excavation in 1921, no less than 13 were children's coffins. Of the two formerly examined, given here as Nos. 31 and 32, one was a child's coffin, the smallest of them all, only 43 cm. long, inside measure, while the largest in the find measures 204 cm.; for further details the reader is referred to our table of coffin lengths p. 72.) Apart from a few of the children's coffins they were all trapeze-shaped, being broadest at the head and tapering toward the foot; sometimes the broad end was also the highest. The most pronounced trapeze shape was found in No. 27 (fig. 47—48) which measured 35.5—12.5 cm. in breadth. When a coffin of this description, having a length of 180 cm., measures 35.5 cm. at the top end, its width in the place where the shoulders have been will only be 30 odd cm. It must have been a person of strange proportions buried here, if he or she really filled out the length of the coffin without having a greater shoulder-width than 30 cm. On the whole, in the case of the coffins for adults, the breadths more than the lengths show surprisingly small figures. Of 17 coffins for adults, only five show a breadth at the top of 50 cm. or more, while six lie between 36 and 32 cm[1]).

The woods employed are mainly spruce, deal, red pine or larch and consist both of drift timber and imported timber. Only a single specimen has been ascertained to be of native growth, viz. the board from coffin No. 26 previously mentioned (p. 48) on which was carved a dragon's head etc. This piece of wood which measures 29 by 8.4 by 1.1 cm., has been determined by Dr. Knud Jessen as juniper (Juniperus communis L.). Juniper grows even in our day in the south of Greenland where the stem may attain a thickness of up to 14.5 cm.

As a rule the coffins are joined by the long sides being placed outside the bottom, the end-pieces on the top of the latter and between the sides, while the lid lies on the top of all four sides, or on the top of the end-pieces only, and between the sides. The pieces are joined with wooden nails, in many cases very neatly tooled, either round or square, having rounded or domed heads. In a few of the coffins, see especially Nos. 30 and 32, the bottom and sides were made with grooves for the insertion of the end-pieces. Sometimes the method of joining is somewhat different, thus it may occur that the long sides are placed on the top of the bottom, but this is seen to be rather unpractical from the fact that in such cases the sides have been pressed towards each other by the pressure of the earth. Of more importance is a difference in the way the pieces are kept together. Instead of being joined by means of wooden nails, three of the coffins, Nos. 25—27, are entirely or partly tied together with whalebone fibres in the way described below, corresponding to the method employed by the Eskimos. Generally spoken we cannot state with any certainty whether these coffins are of earlier or later date than the others, but at any rate there is one of them that belongs to the oldest pieces of the find, viz. the coffin No. 26 already previously discussed in chapter III. According to its situation it is older than the church and for that reason it can hardly be of later date than abt. 1200.

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[1]) The whole of this question has been dealt with in more detail below by Professor F. C. C. Hansen.

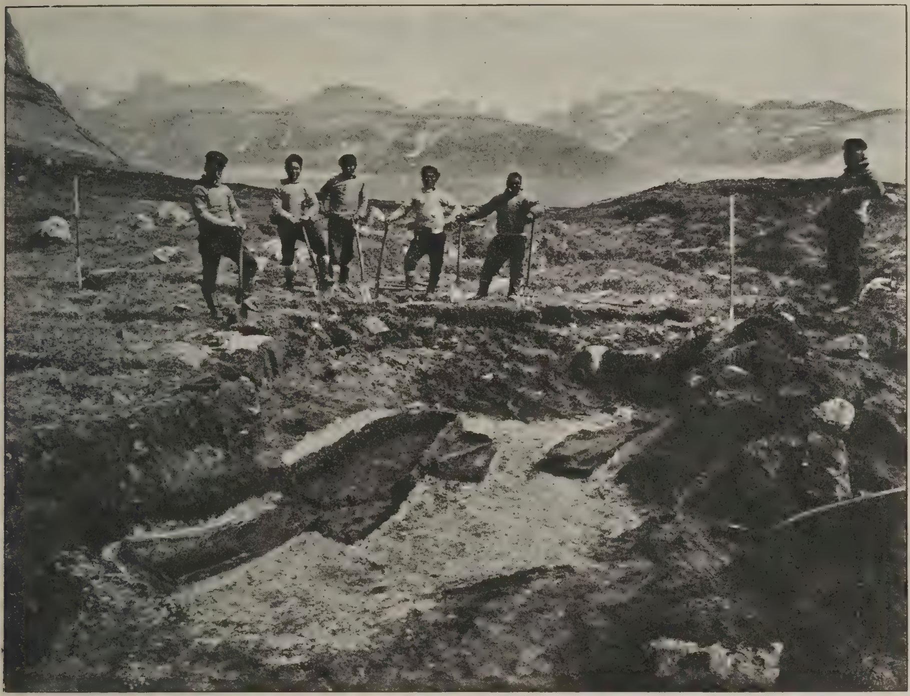

Fig. 44. The first, badly preserved coffins (Nos. 2—5).

On another of the coffins tied together with whalebone fibres lay cross No. 135 which, judging by the runes inscribed on it, cannot be assumed to be of earlier date than abt. 1300 (se Professor Finnur Jónsson's paper below), and this brings us a step towards the period from which the greater part of the find dates.

The quality of the planks used for the coffins differs greatly. In a few cases they are stout and good, above all in the remarkably well preserved No. 30. More often the coffins testify to the lack of wood in the country, their planks bearing the mark of having been used before in other ways. Or the sides may be made up of several pieces which are then either scarfed or dowelled together or held together by cross-pieces.

In the well preserved planks it may still be seen how the surfaces have been treated first with the carpenter's axe and afterwards levelled and smoothed with a scraper on the inside. In several cases the edges have been planed off.

Five of the coffins were entirely without lid,[1] but as we have already remarked, it is most likely because they have been broken open and used a second time. There may not, then, have been room for the lid. It was more surprising to find coffin No. 19 without a bottom. It must have been put together on the spot and the body lowered into the grave. The same is the case with No. 5 which had, as it were, been built against an older coffin, having one side in common with it. In several other cases great quantities of waste timber were found round the coffins, giving rise to the conjecture that the coffin was made or at any rate joined in the churchyard.

In the succeeding description of the separate coffins they are arranged according to the order in which they were found.

Internal dimensions of the coffins in cm.

Numbers	Length	Breadth at the head	Breadth at the foot	Numbers	Length	Breadth at the head	Breadth at the foot
2....	204	54	37	17....	45	12	
3....	169	35	18	18....	52	15	10
4....	196	53	26	19....	174		27
5....	87			20....	154	35	22
6....	62			21....	48	11	7
7....	58			22....	180	43	35
8....	53			23....	165	36	29
9....	189	50	26	24....	55	9	7
10....	55	16		25....	175	50	25
11....	172	50	20	26....	162	35	25
12....	63	21	13	27....	180	35,5	12,5
13[2] ..		22		28....	160	32	22
14....	193	40	22	29....	170	44	22
15....	88			30....	161,5	43	31
16....	52	14		31....	168	47	39
				32....	43	15,5	10

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[1] Here we do not take into consideration the fact that several other coffins were so incompletely preserved that we cannot wonder that the lid was missing.

[2] Child's coffin, incomplete.

No. 2.*[1]

Coffin, found west of the church, the bottom abt. 50—55 cm. below the old surface. It was the largest of all the coffins, its length must have been 2.04 m. inside measure,[2] its foot-end abt. 37 cm., its top-end presumably abt. 54 cm. broad. The latter end had, however, been cut away, all except the left side, when, on a later occasion, a grave was dug for another coffin (No. 4).

The three sides preserved, the greatest height of which was 22 cm., all stood outside the bottom which consisted of two planks joined by means of cross-pieces on the lower side. The planks were at most 2.5 cm. thick, they were very rotten and penetrated by plant roots. The lid was missing. In the coffin was no vestige of the body, but remains of a cross (No. 165) were found with it.

No. 3.*

Coffin found at the western end of the church close to the inside of the south wall in a place where one might have expected to find the west gable (comp. above p. 49). Its bottom was abt. 65 cm. below the old surface.

Its inside length was 1.69 m., its top-end was 35 cm., its bottom-end 18 cm. broad. It was thus an extremely narrow coffin. The sides stood outside the bottom and had been nailed with three nails to the edge of it. The foot-piece was placed between the sides, the top end-piece was missing as well as the lid. The planks were only 1.5 cm. thick, but they were very rotten and have no doubt been much stouter originally. There were no contents in the coffin.

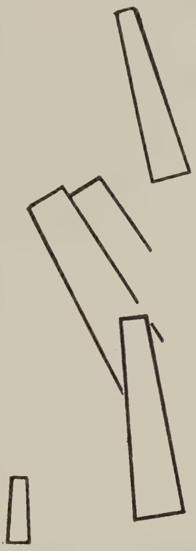

Fig. 45. Position of the coffins No. 2—6.

No. 4.*

Coffin found west of the church and immediately west of coffin No. 2, into the top-end of which it had penetrated. It is thus of later date than No. 2, although its bottom lay abt. 50 cm. deeper (barely 1 m. below the old surface).

Its inside length was 1.96 m. Its top-end was 53 cm., its foot-end 26 cm. broad. The length is the greatest but one in the find. The height of the sides was 31 cm. in the highest place. The planks were 2.2 cm. thick.

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[1] For the whole find we use continuous numbers. No. 1 is the deal plank mentioned above, p. 46 (fig. 31).

[2] All measurements of the coffins are internal, if no special indication is given.

The long sides were placed outside the bottom to which they were fastened with a great number of nails, the end-pieces on the top of the bottom and between the sides. All the pieces consisted of several planks kept together by cross-pieces, two under the bottom, two on the inside of the sides, and one in the top end-piece. The lid had been crushed in by the pressure of the earth and lay in splinters in the coffin which was filled with earth. It had been secured to the top-edge of the coffin with treenails.

The wood was in a better state of preservation than in the other coffins in the vicinity, but, then, it was standing much deeper. The contents of it were, however, quite decayed.

No. 5.*

Coffin found west of the church on the southern side of coffin No. 2 and actually placed against the latter whose south side served as north side in the new coffin of which, however, only the foot-piece and part of the bottom plank had been preserved, in a very rotten state like No. 2. The rest has probably been discarded when the hole was dug for coffin No. 4.

The bottom lay a little deeper than coffin No. 2 (abt. 60 cm. below the old surface).

Nos. 6—8.*

Three children's coffins found west of the church lying in continuation of each other and fairly near to the surface (the bottom abt. 40 cm. below the old surface), and hence very rotten. No. 7, in addition, was much compressed. Their inside length was 62, 58 and 53 cm. respectively. No. 8 was rectangular while the others tapered slightly towards the bottom-end.

No. 9.*

Coffin found west of the church, the bottom 60 cm. below the old surface. Its inside length was 1.89 m., its breadth at the top-end 50 cm., at the foot-end 26 cm. Greatest height of the side 35 cm. The lid, of which broken fragments were found inside the coffin, must thus have been lying only abt. 25 cm. below the surface. The condition of the coffin was almost like that of the preceding ones (figs. 162-163).

When the earth was emptied out, the outlines of the skeleton could still be seen as black lines in the brown sand, otherwise everything was decayed.

The sides of the coffin were each made of one plank, and as usual the end-pieces were placed between the sides. As an exception all four sides rested on the bottom to which they had been fastened with treenails (6—7 in the sides, 2—3 in the end-pieces). The bottom consisted of two pieces, one of which was only a narrow strip, dowelled together with treenails.

No. 10.*

Child's coffin found west of No. 9, the bottom lying only abt. 35 cm. below the old surface. The greatest height of the sides being 13 cm. the lid, which had now entirely disappeared, can only have been a good 20 cm. below the surface. Consequently the state of preservation was not good (fig. 163).

The coffin which was rectangular, had an inside length of 55 cm. its breadth was 16—17 cm. The long sides were placed outside the bottom, the end-pieces between the former and on the bottom, all fastened with treenails.

The coffin only contained earth.

No. 11.*

Coffin found by the south-eastern corner of the nave at a considerable depth (abt. 1.35 m. below the old surface) and below later interments (dress-fragment No. 56). Its inside length was 1.72 m., the breadth at the top-end abt. 50 cm., at the bottom-end abt. 20 cm. Greatest inside height of the sides 23.5 cm. The bottom consisted of 2 planks joined by cross-pieces on the lower side. The long sides were as usual placed outside the bottom, the end-pieces on it. The lid, which had been pressed to pieces by the superimposed earth, consisted of several parts. The middle part, in which there were numerous nail-holes from former use in other ways, had been scarfed together of two planks, and on the upper side of the lid there was a cross-piece. The lid must have rested on the end-pieces but have lain between the sides and been fastened to the latter with a row of treenails like the bottom.

The coffin was filled with earth in which the entirely decayed body could just be distinguished. The left hand lay on the breast, the right hand across the abdomen. The shoulders were so close to the top-end that we must assume the head to have been raised and supported against the edge of the coffin.

No. 12.*

Child's coffin found by the south-western corner of the nave with the bottom abt. 1 m. below the old surface. Its inside length was 63 cm., the breadth from 21—13 cm., the height of the sides was greatest at the top-end and decreased towards the bottom-end from 18 to 14.5 cm. The four sides encompassed the bottom to which they were fastened with treenails. The lid which had been pressed into the coffin had lain between the side-pieces and rested on the end-pieces. Apparently it had not been fastened with nails.

No. 13.*

Top-end of an otherwise disturbed child's coffin, found south-east of the church, the bottom at a depth of abt. 1.15 m. below the old surface. It was 22 cm. broad.

The lower part of a cross was found with it (No. 163).

No. 14.*

Coffin found by the south-eastern corner of the nave, the bottom abt. 1 m. below the old surface, under later burial-layers. Its inside length was 1.93 m., its breadth 40 to 22 cm. The long sides were as usual placed outside the bottom, the end-pieces on it. The lid which was fairly well preserved but pressed into the coffin, seemed to have rested on the end-pieces.

The body was entirely decomposed and could only be distinguished as a silhouette adhering to the bottom of the coffin. Its length was 1.73 m.

No. 15.*

Child's coffin found south-east of the church, the bottom abt. 85 cm. below the old surface. Its inside length was abt. 88 cm. and it was almost rectangular, or more correctly, contrary to the usual custom, its bottom-end was slightly broader than the top-end. The pieces had been joined in the usual manner. The lid, which had been pressed into the coffin, had lain between the sides and rested on the end-pieces.

In the coffin lay a small sleeve-less frock (No. 61) and on the breast of it the finely carved cross No. 154 of typically late Romanesque character. This is the only case in which clothing or traces of clothing were found in a coffin during the excavation of 1921. The body itself was decomposed, even the bones.

No. 16.*

Small child's coffin found south-east of the preceding one but in a somewhat deeper layer (the bottom fully 1 m. below the old surface). Its inside length was 52 cm., its breadth 14 cm. The coffin was in a very bad state and contained nothing but earth.

No. 17.*

Small child's coffin found south of the chancel, the bottom barely 1 m. below the old surface. It was much decayed. Its inside length was 45 cm. (it was thus the shortest of all those found in 1921). Its breadth seems to have been 12 cm.

No. 18.*

Child's coffin found south of the chancel, its bottom abt. 90 cm. below the old surface.

Its inside length was 52 cm. and it was regularly trapeze-shaped (breadth 15—10 cm.). The parts had been joined in the usual way. The long sides had been broken and pressed towards each other. The lid rested on all four sides. The coffin only contained earth.

No. 19.*

Coffin found south of the chancel under the child's coffin No. 12, its bottom lying 1.20 m. below the old surface. Its inside length was 1.74 m., its breadth at the foot 27 cm. The top-end had been disturbed.

There were found remnants of a lid pressed down in the coffin, but no bottom was found so it must have been built on the spot like the stone-lined graves in Europe. The body was quite decomposed and lay in a sticky mass on the firm gravelly substratum.

At the head lay a piece of brown, well preserved woollen cord (No. 97 below) but nothing else was found in the coffin.

No. 20.*

Coffin found south-east of the church, under the child's coffin No. 15 containing the fine Romanesque cross. The bottom was abt. 1.15 m. below the old surface. The inside length of the coffin was 1.54 m., its breadth at the top-end 35 cm., and 22 cm. at the bottom-end. The sides and bottom were assembled in the usual way. The greatest height of the sides was 17 cm. They consisted each of one piece, while the bottom had a narrow piece added at the broad end. In the bottom plank there were fifteen nailholes with wooden plugs, irregularly distributed. The lid had broken owing to the pressure of the earth and the coffin was filled with earth. Of the body there was only the usual silhouette left. On its breast lay a simple cross, one arm of which was missing.

No. 21.*

A small child's coffin found south-east of the church under coffin No. 20, which again lay under No. 15. The bottom lay abt. 1.30 m. below the old surface. Its inside length was 48 cm., its breadth from 11 to 7 cm. The lid had been preserved and rested on all four sides.

No. 22.*

Coffin found south of the chancel, its bottom abt. 1 m. below the old surface. Its inside length was 1.80 m., its breadth 43—35 cm. It was unusually high, being 32 cm. outside measure. The long sides were placed outside the bottom, the end-pieces on top of it, a small groove having been cut for them. The lid had been pressed in with the weight of the earth. The coffin only contained earth. Immediately on top of this coffin lay a later, entirely decomposed interment.

Nos. 23—24.*

Coffin found by the south-eastern corner of the chancel fully 1 m. below the old surface. The outside of the church-walls are only preserved in part in this place, but according to the ground-plan it seems certain that these coffins have stood under the wall, and they are consequently of earlier date than the church. Its inside length was 1.65 m., its breadth 36—29 cm. It was joined in the usual way, and like several of the other coffins, the broad end of its bottom had had a small strip added to increase the breadth, the pieces being joined by means of a cross-piece on the lower side. The lid which has lain between the sides and rested on the end-pieces, had been broken and pressed into the coffin. On top of it, at the top end, stood a small, quite narrow child's coffin, its inside length 55 cm., breadth 9—7 cm. The lid of this, too, had been pressed in, and it contained nothing but earth.

No. 25.

Coffin (fig. 46) found west of the north-west corner of the church, the bottom lying abt. 95 cm. below the old surface. Its inside length must have been abt. 1.75 m., its breadth 50—25 cm. The end-pieces have been placed between the sides, but contrary to the usual custom, all four sides rest on the bottom. The sides were highest at the broad end (28 cm.). The bottom consisted of three planks, partly joined by cross-pieces on the lower side, partly tied together with whalebone fibres like the other pieces of the coffin. To each binding belong three holes, two through which the fibres are lashed, and a third one in which the ends are inserted and pressed firmly down with a treenail. In several places grooves have been cut in which the fibres may lie without being worn or cut over. Of the fibres themselves hardly anything was left.

The lid, which had rested on the end-pieces, had a small piece added to the breadth. The pressure of the earth had broken the end-pieces, so that the lid had fallen into the coffin. The wood was in an excellent state of preservation and the coffin was taken to Copenhagen where it is preserved in the National Museum with the rest of the find.

No. 26.

Coffin found at the eastern gable of the chancel, the bottom 1 m. below the old surface. Its top-end stood so far in under the foundations that the coffin must have been buried before the wall was built.

Its inside length was 1.62 m. its breadth 35 cm. at the top-end, 25 cm. at the foot. Its height was 28.5 m. at the top-end, decreasing towards the foot to 19.5 cm. The long sides were as usual placed outside the bottom, the end-pieces rested on it, and all pieces were fastened to the

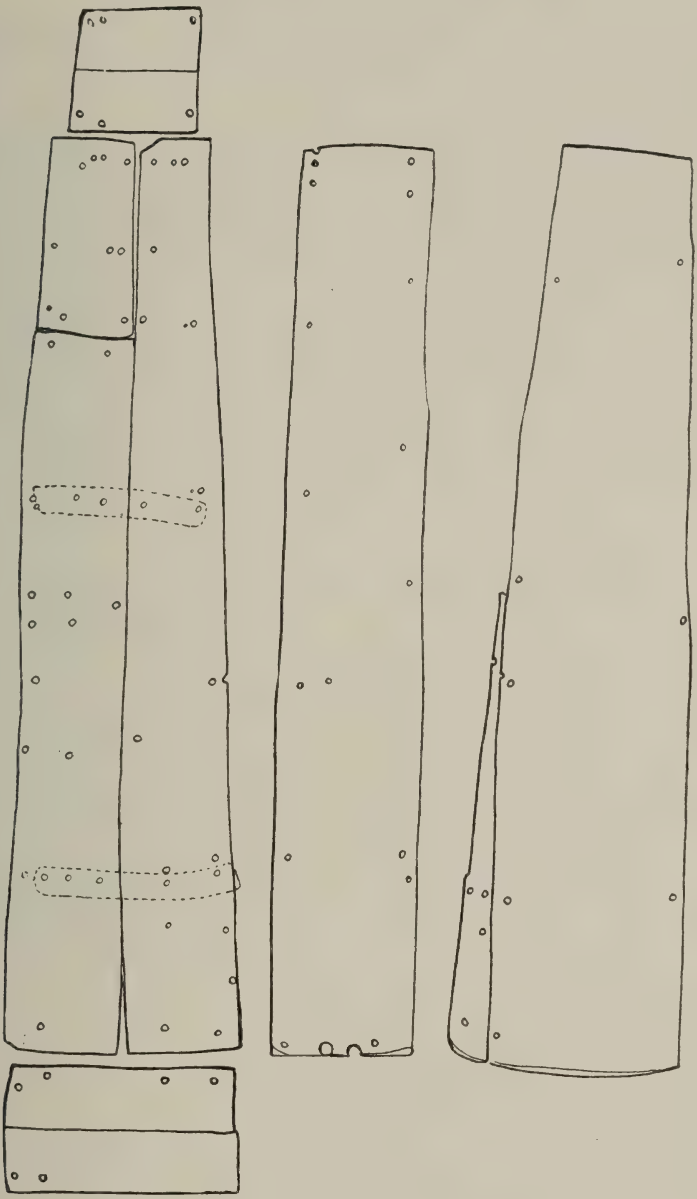
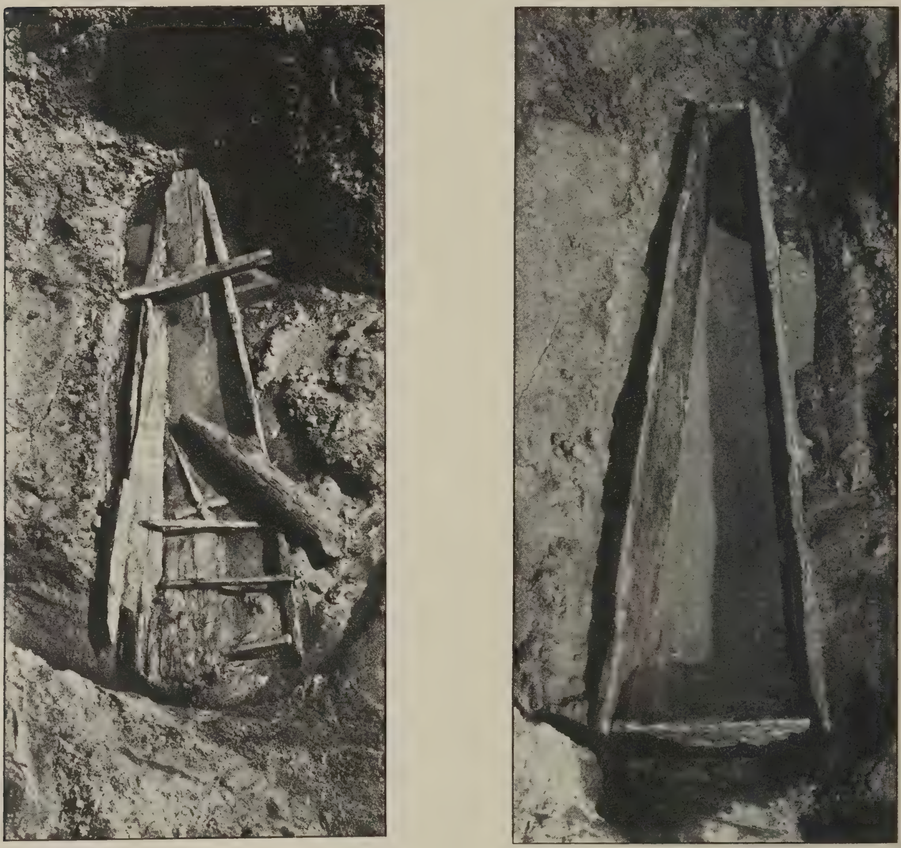


Fig. 46. Diagram of coffin No. 25 (abt. $^1/_{15}$).

Left to right: the bottom with two end-pieces, right side and lid.

bottom with treenails. The bottom plank had a piece added to the breadth at the broad end. The end-pieces consisted each of two about equal halves, and the lid, which had been pressed into the coffin, had also been joined of at least two planks held together by a cross-piece on the lower side. The sides were tied together at the corners with whalebone fibres in three places, one above the other, at each corner. On a level with the holes there were notches for the fibres in the edges of the end-pieces in order to prevent them being cut over by the sharp edges, and, as in the preceding coffin, the ends of the fibres had been pressed into a third hole where they were secured by treenails.



Figs. 47—48. Coffin No. 27 with narrow foot end.

Left: The coffin covered with the broken lid on the top of which is seen the rune cross No. 136.
Right: The coffin after the earth was emptied out of it.

Several of the planks bore marks of former use, for instance nailholes which were useless in the present position. In the upper half of the foot-piece (made of juniper-wood), were found on both sides some roughly carved ornaments which we have described and discussed in chapter III (fig. 32). There is no other piece among the finds from Herjolfsnes which shows features of so early a style as these ornaments. We have referred them to the period abt. 1200.

On the breast of the entirely decomposed body lay a simple wooden cross (No. 111).

No. 27.*

Coffin found in the western part of the churchyard with the bottom at a depth of 1 m.—1.10 m. below the old surface, surrounded by frozen layers and therefore in an excellent state of preservation. Once the earth had thawed the water came pouring in with overwhelming power and rendered the examination very difficult. The coffin was 1.80 m. long inside and was markedly trapeze-shaped (fig. 48), the top-end being 35.5 cm., the foot-end only 12.5 cm. broad. As usual the end-pieces were placed between the long sides, but the four sides were joined to each other and to the bottom by means of whalebone fibres; only trifling remnants of these had been preserved, while the holes through which they had been passed were intact, 6 sets between the long sides and the bottom, 2 sets at each side of the top-end, and one set at each side of the foot-end.

The lid has rested on all four sides. It had been pressed down in the coffin and was broken in several places. On the top of it lay various pieces of wood (fig. 47), and likewise under the coffin. These are hardly remains of earlier coffins dug up, but most likely waste-timber, the coffin having no doubt been made on the spot. On the lid there lay also a cross having a runic inscription (No. 136), and inside the coffin, near the top-end, another cross of simple shape (No. 112).

No. 28.

Coffin found at the north-western corner of the church immediately against the foundation and at a considerable depth (abt. 1.20 m. below the old surface), far below the thaw-line at midsummer (fig. 165). Consequently the wood was in an excellent state of preservation.

The inside length of the coffin was 1.60 m., its breadth at the top-end abt. 32 cm., at the bottom-end abt. 22 cm., the height 29 cm. above the bottom. Sides and bottom were joined in the usual way with tree-nails. The long sides consisted of two planks one over the other dowelled ogether, the bottom of three planks scarfed and nailed together, the id which had been broken with the pressure of the earth was made up of two short pieces at the ends and two long pieces between these, oined by means of grooves and nails.

On the top-end board, which has been brought to Copenhagen, and on one of the planks of the lid, is a kind of chequered or lozenge pattern in which every second square is filled in with oblique lines in a clumsy manner (fig. 49). This pattern which has been cut with an axe, antedates the time when the pieces were cut up for the coffin.

In the coffin lay a small wooden cross of fine workmanship, having circular ends. It was in an excellent state of preservation (No. 153, fig. 149).

No. 29.*

Coffin found by the north-east corner of the nave with the bottom abt. 75 cm. below the old surface. Its inside length was 1.70 m., its breadth 44—22 cm., its greatest height 30 cm. All four sides rested on the bottom and consequently the long sides had not had the usual power of resistance to the pressure of the earth, the middle portions had been pressed much towards each other, which gave the impression of a very exaggerated trapeze-shape. The bottom consisted of three pieces, scarfed together, a larger rectangular plank, a narrower wedge-shaped piece and a small strip at the broad end. The lid had in part been pressed into the coffin. It consisted of two pieces, one of which was a short transverse piece at the foot lying over the sides to which it was fastened with small treenails. (Figs. 50 and 164).

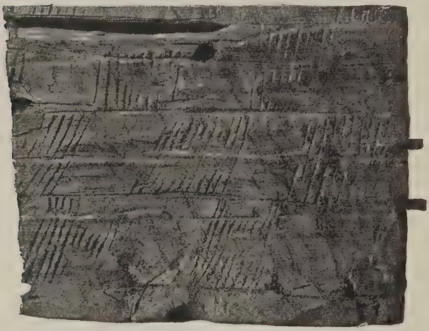


Fig. 49. End-piece from coffin No. 28. At the edge two treenails.

In the coffin lay a large rather rude cross having semicircular hollows at the intersections (No. 138). Contrary to the usual custom it lay at the foot-end and pointing towards the west.

No. 30.

Coffin, “Gudveg’s cenotaph”, found north of the chancel under a very heavy granite boulder which could only be removed with the greatest difficulty (figs. 51 and 52). The bottom was barely 1 m. below the old surface. The circumstances of the finding of this curious and remarkably well preserved coffin have been related above (p. 62).

It consists of five deal planks from 3 to 3.8 cm. thick, viz. one bottom-piece and four sides. The faces have first been rough-hewn with a carpenter’s axe. On the under side of the bottom, which did not require more careful treatment as it did not show, may still be seen numerous marks of the axe. The other surfaces have undergone further treatment probably with a scraper which took the place of the plane in the Middle Ages. Besides, it deserves notice that in this as in other coffins the inner sides are treated with more care than the outer sides.

As usual the long sides are placed outside the bottom while the end-pieces rest on it, fitting into a groove large enough to receive them.

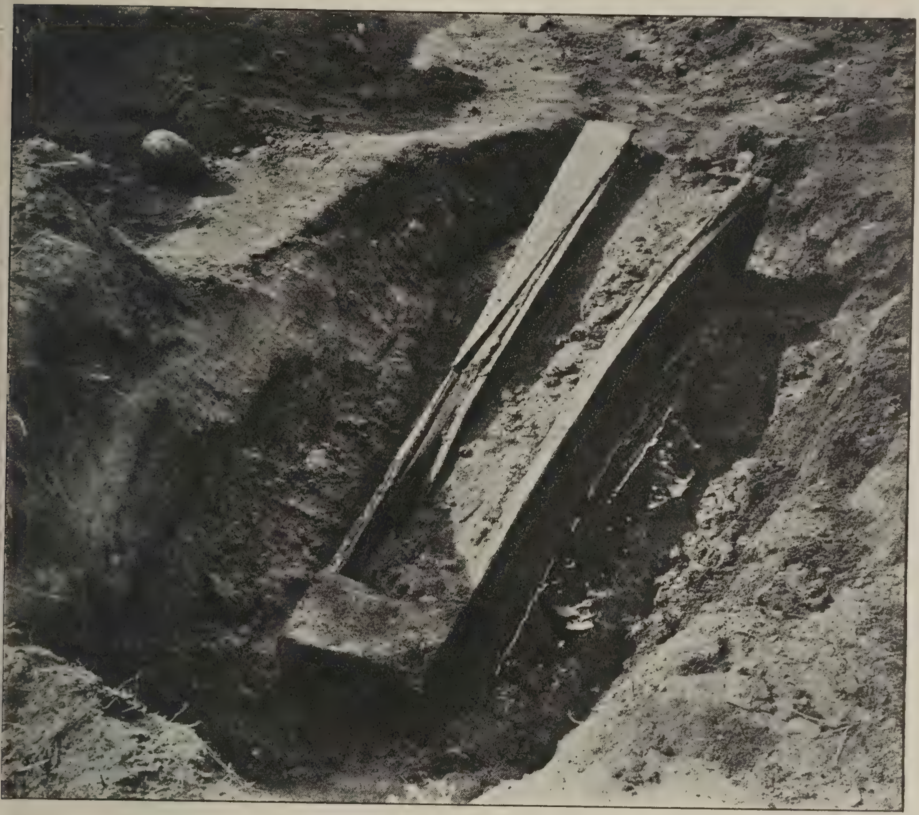


Fig. 50. Coffin No. 29.

The end-pieces stand between the long sides which also have small grooves at the ends. The parts are joined with large treenails, carefully shaped.

The trapeze-shape of the coffin is not very pronounced. Its inside length is 1.615 m., its breadth is 43 cm. at the top-end, 31 cm. at the foot.

In the bottom at the place of the breast is carved a cross, 11 × 12.5 cm. in size.

At the top-edge of all four side-pieces is a row of nailholes in some of which there are still remains of treenails. They have served to fasten the lid which has now entirely disappeared. It must have been removed when the coffin was used for the second or perhaps for the third time. On carefully emptying out the earth in layers, we found traces of two corpses in the coffin, but we had only trifling remains of brain-substance to go by. Considering the remarkable freshness of the wood, it is almost inconceivable that the bodies can have been so completely decomposed.

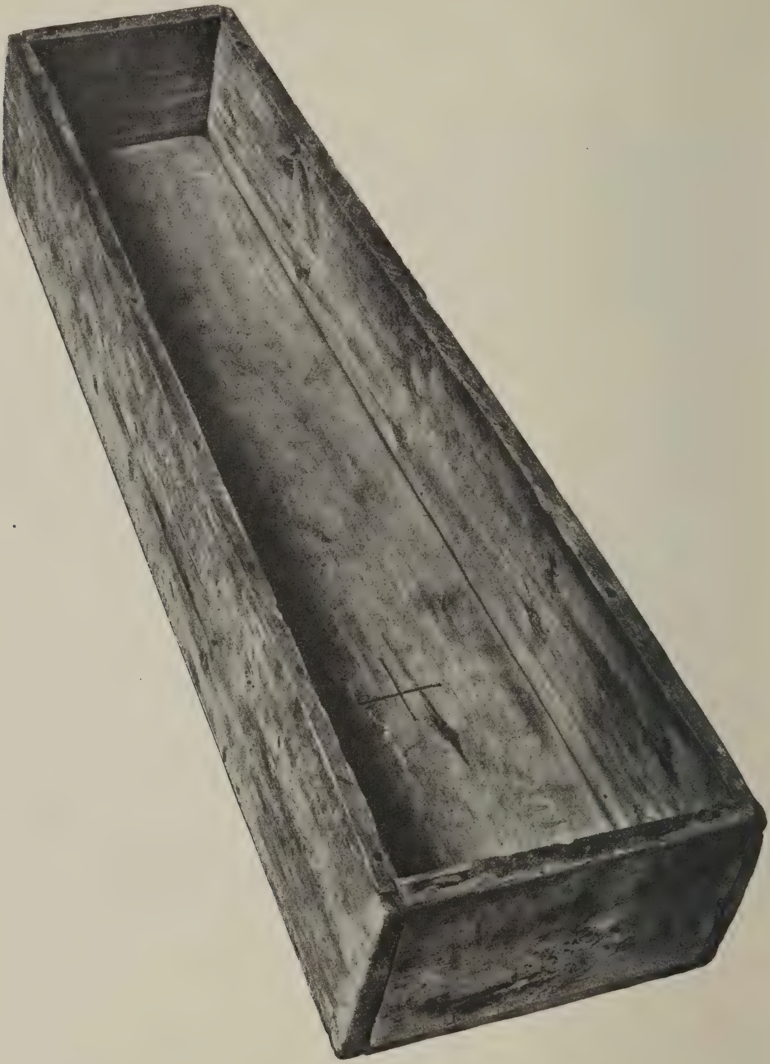


Fig. 51. Coffin No. 30 after conservation.

The most remarkable feature about the coffin was, however, the small square deal stick (No. 166) inscribed with very plain runes, found in the north-western corner of it (in fig. 40 it may still be seen in its place). Among

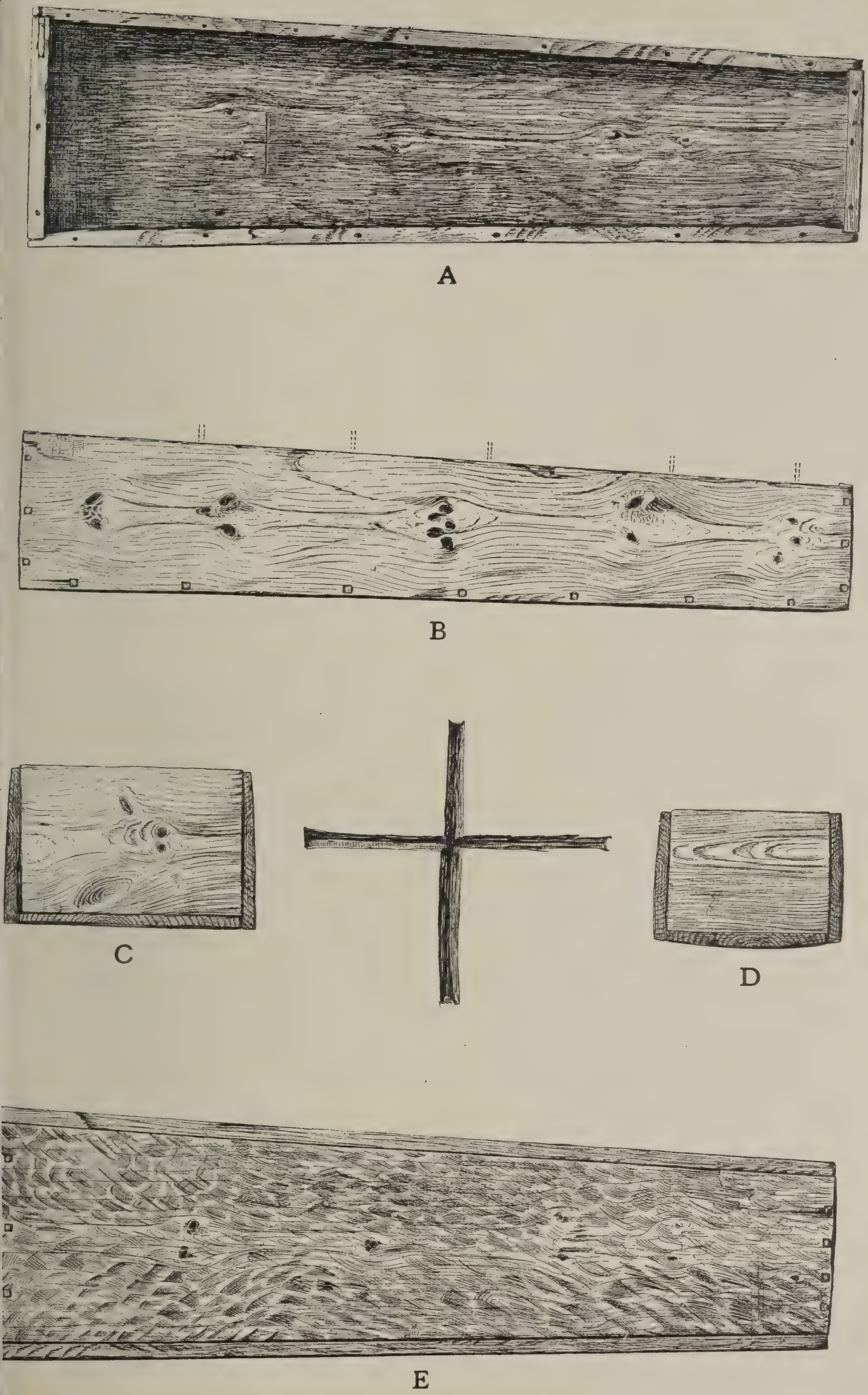


Fig. 52. Coffin No. 30 (abt. $^{1}/_{15}$, the cross abt. $^{1}/_{3}$).
A, viewed from above. B, viewed from the right. C and D, end-pieces. E, underside of the bottom.

all the objects of the find it is perhaps that which appeals most to the imagination. It has been mentioned in page 62, and the runic inscription is dealt with below by Professor Finnur Jónsson.

In connection with the above we shall further mention two coffins found and examined on former occasions.

No. 31.†

Fragments of a coffin found by G. Holm in 1880. The coffin, which contained a human skeleton having no shroud, was made of a bottom-piece 172 cm. long (inside length of the coffin probably 168 cm.), 47—39 cm. broad, formed of a larger plank pieced at one end with a plank 15.5 cm. long, scarfed on. The long sides were placed outside the bottom, the end-pieces rested on it. The long sides sloped slightly outward, the end-pieces being thus broader at the top than at the bottom (comp. fig. 49). There were no traces of a lid and no treenail-holes at the top-edges of the side-pieces.

No. 32.†

Child's coffin found by district physician Meldorf at a digging in October 1900 and acquired by the National Museum from his widow in 1912.

Its inside length is 43 cm., its breadth 15.5—10 cm. The top end is not only the broadest but also the highest, the side-pieces decreasing in height from 10.5 to 7 cm. at the foot-end. The foot end-piece is missing, but all the other pieces including the lid are preserved in very good condition. The sides all rest on the bottom and the lid rests on all the sides. The parts have been joined by means of small treenails. The long sides have grooves at the ends where the end-pieces are joined on. Each part of the coffin consists of a single piece, except the top-end where two pieces have been dowelled together.

Chapter VI. The Costumes.

General Remarks.

The great number of shrouds found at Herjolfsnes cemetery derive their special interest from the fact that they all consist of genuine articles of clothing, sometimes complete, sometimes mere fragments, but rarely so fragmentary that we cannot determine their use. We will describe and treat them group by group, the body-clothing, the headgear and the clothing for the legs, but first we must offer a few general remarks on the nature of the material, its treatment, and similar questions.

All the costumes are of woven material though there can be no doubt that fur clothing was largely worn by the Greenlanders.[1] When none such has been found it may be partly because it was not very often employed for shrouds, and partly because it has not resisted the ravages of time as well as the woven costumes. A striking example of this was seen when dress No. 39 was uncovered. It was in an excellent state of preservation while a sealskin which was spread over it was nearly decayed. With the dress was also found a piece of an oxhide or perhaps a goat's skin and also unspun hairs of sheepskin possibly originating from the lining of the dress. On another spot a small piece of polar bear skin, dyed red, was found together with the fragment of a cross (No. 127) and other small remains of a disturbed grave west of the church. It is probably the trifling remnant of an entire fur costume, but that was all that was left.

The material of all the costumes is made of wool[2] and, as far as can be concluded from a series of tests, entirely of sheep's wool. The thread is nearly always simply twisted. Thread spun of two yarns only occurs quite exceptionally. The mode of weaving is most frequently fourshaft-twill, in which the weft-thread has been alternately passed over and under two warp-threads with a continual advance of one thread, so that a diagonal so-called twill pattern has resulted (fig. 53). This was the most common mode of weaving in the North as far back as the Roman Iron Age.[1])

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[1] It is often mentioned in the old records of Greenland. The sibyl ("völve") Thorbjörg who lived near Herjolfsnes wore a black lambskin hood lined with white cat's skin (GHM. I p. 375). Thormod Kolbrunarskjald had a double fur-coat, white on one side, black on the other (Ibid. II, p. 333). Cp. Ibid. III, p. 97.

[2] Adhering to the skeleton, however, were found pieces of a coarse linen-like material, partly on the front of the thoracic vertebræ of No. 65, partly covering the entire skull of No. 79 from the neck to the root of the nose. Finally, with dress No. 39 are found a few threads of hemp. Cp. Anatomical Section X, XVII and I.

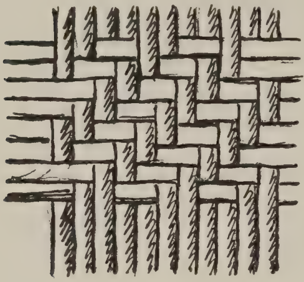
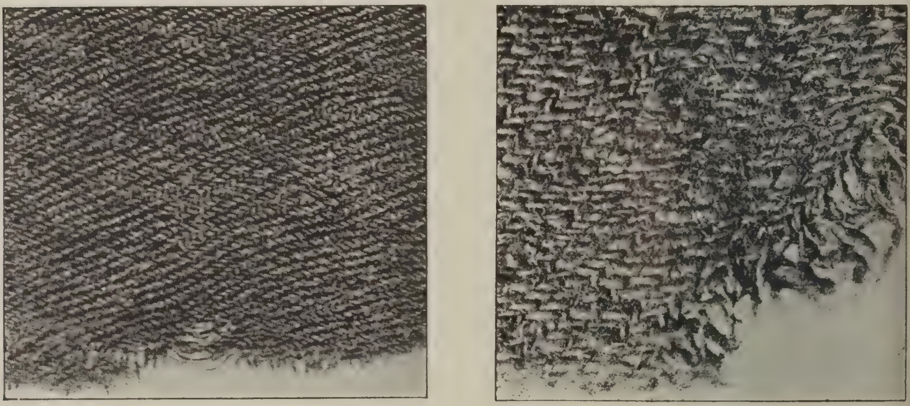


Fig. 53. Fourshaft-twill. Diagram of weaving.

Plain weaving, in which the weft-thread is passed alternately over one and under the next warp-thread, occurs more rarely in the find from Herjolfsnes. As a rule it is found in the loosest and coarsest material, for instance the hose-material, though it also occurs in a single little piece, which is the finest and thinnest in all the find (No. 96).


Figs. 54—55. Two samples of fourshaft-twill. Natural size.

Nearly everything that has been found, at any rate of larger pieces, is sufficiently heavy to come under the designation frieze, but there is a considerable difference in fineness, partly because the threads are of very variable thickness, partly because the weaving is more or less close. Figs. 54 and 55 show samples of the stoutest and the thinnest among the twills, both natural size.

The largest piece found shows a width of material of almost 1 meter (No. 37), and several times we find widths of over 80 cm. (Nos. 42 and 45).

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[1]) AfnO. 1900, p. 277.

Neither fancy patterns nor woven borders or ribbons have been found,[1] but cord has been largely employed both for edging the dresses and for lacing up slits etc. The simpler kind is twisted of two threads. A cord 1.12 m. long twisted of about ten threads of different thickness was found in coffin No. 19. But more frequently the cords are plaited. Several fragments plaited simply of three strands were found, but of greater interest is some small fine cord for edging (only about 1 mm. thick) which is often found on the costumes. It consists of six threads plaited from the outside towards the middle, over three threads always, alternately from the right and the left, and each time the two middle ones are twisted (fig. 56).

The hems have been very differently finished. Sometimes they are simply turned under and the raw edge overcast, but often they have further been stitched with one or two rows of back-stitches. The hoods especially are often decorated at the edges with fine darnings, and several of the dresses are edged with cord simply twisted or of a more complicated plaiting as above described. This latter sort, which may be found both at the neck, the sleeves, the pocket-slits, and the lower edge, is remarkable by its slight thickness, it must have been a very discreet, scarcely noticeable, trimming. In No. 63 the front opening and the neck are edged with a thin material of a lighter colour. The seams down the back (No. 63) or under the arms (No. 41) may sometimes be ornamented with backstitches.

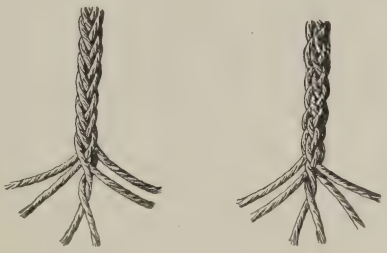

Fig. 56. Cord plaited of six threads.
Left: System of plaiting. Right: Cord as it appears on top. (Magnified twice).

One of the first questions that presents itself in regard to such medieval costumes will be whether they were dyed in bright colours. In their present state they show only a limited scale of colours from brown to black, but they might possibly have become decolorised through the influence of time and the earth, and their original colours might still be ascertainable by microscopic examination. Professor Bille Gram, who has previously made similar examinations of archæological material with good results, rendered valuable assistance in this case, too, by a series of microscopic examinations of samples. It was not ascertained that bright colours had been used, but black and brown dyes were found. A most interesting piece of information was, however, gained by these investigations. It appeared, that threads of two colours had been largely employed, the warp-thread being spun from the wool of black sheep which would sometimes be dyed black besides, whereas the weft-thread was made of the wool of white sheep dyed brown.[1]) Thus the weft-thread is frequently of a lighter colour than the warp, and when the contrast is sufficiently marked to become noticeable, a peculiar "shot" effect is produced which is not unpleasing.

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[1] A couple of pieces of material found with No. 77 which seemed to be of a somewhat unusual kind of weaving, were examined by Miss E. Mygdal. It proved, however, that their unusual appearance was due rather to carelessness than to art, very different sorts of thread having been used, partly simple rightspun yarn, partly twisted thread which might be either left- or rightspun and varie much in thickness.

No lining was found in any of the costumes — apart from the trifling remnants of skin and linen found in the microscopic examination (see p. 87, note 2) the interpretation of which is problematic — and we cannot say with certainty that there has ever been any. In some of the hoods and dresses there may however occur very carelessly finished or quite unfinished edges, simply turned under and neither stitched nor overcast. In such cases, when the garment is otherwise carefully finished, it is a tempting conjecture that the edges have been covered with a lining, most probably a fur-lining.

As we mentioned before, the costumes were not made for the dead, but were worn by them when they were still alive. Hence they bear marks of wear, and indeed, many of them are quite threadbare and patched with big patches. Gowns No. 43 and No. 64 and the cap No. 83 are typical examples showing how threadbare clothes were worn before they were discarded. Mending was done by means of patches, even in the case of small tears, darning as a means of repairing was evidently unknown.

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[1]) We quote from Professor Bille Gram's report: Hood 78. The sample consisted of lighter and darker threads, *a* and *b*.

a. Threads consisting for the greater part of natural colourless (white) sheep's wool, artificially dyed brown. (The dye may be removed by boiling in alcohol containing hydrochloric acid). There are, besides, some few naturally brown (black) woollen hairs.

b. Threads of naturally brown (black) sheep's wool, which has further been dyed black. The threads are covered by a layer of black dye which may for the greater part be removed by boiling in alcohol containing hydrochloric acid.

Hood 65. The sample consisted of sheep's wool most of which was naturally brown (black) wool further dyed black, only a smaller part white wool.

Dress 45. The sample consisted of sheep's wool. The threads in one direction are mostly naturally brown (black) wool dyed black, moreover of some finer naturally brown (black) sheep's wool and in smaller quantity of naturally colourless (white) sheep's wool. The threads crossing these consist of coarse, naturally brown (black) wool further dyed black, and of finer, mostly naturally brown (black) wool and a smaller quantity of naturally colourless (white) wool. While the coarser hairs are dyed black, it is probable that the finer wool has not been dyed.

No. 50. The sample consisted of naturally colourless (white) fine, as well as very coarse, sheep's wool, dyed brown.

Body-Clothing. — Descriptive Part.

It would seem a natural course in the first place to group the clothing for the body under the heads of male and female costumes. As we shall see from the following, however, such a grouping presents great difficulties, and can by no means be rigidly enforced in this descriptive section, and even if the "sex" is indicated in each separate case wherever possible, the actual discussion of this subject must be postponed until the final synthesis (p. 137 seq.).

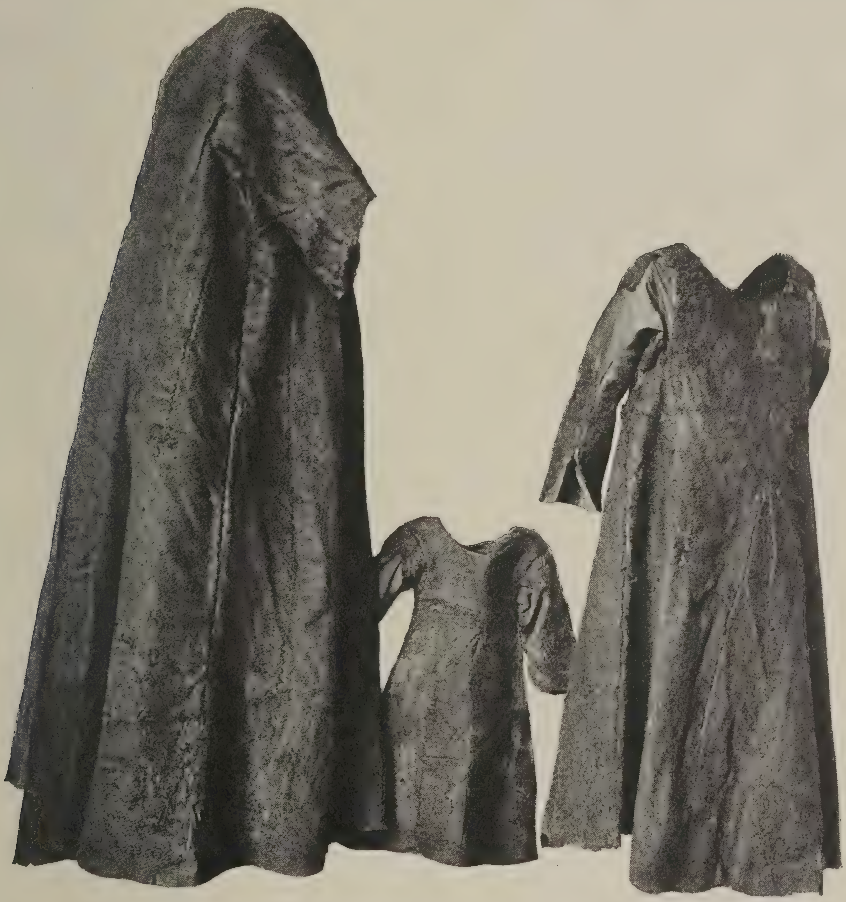

Fig. 57. Three generations. (Nos. 45, 62 and 44).

According to their cut and style the costumes may naturally be divided into two main groups. The first group consists of garments that are slipped over the head like a shirt, and to this category the great majority belongs. The second, quite small, group consists of costumes that are open in front and made to button like the modern male dress.

The slip-over dresses fall under various sub-sections. A common feature is, that they consist of two main-pieces, a front-piece and a back-piece, joined together by shoulder seams. Between these two main-pieces — except in one single case (No. 60) — side-gores are inserted, one, two, or four at each side, which form the armholes together with the main-pieces. The latter may increase in width towards the lower edge, but as a rule they are cut with parallel sides and slashed in the middle from the lower edge almost to the waist where one or two gores are inserted.[1] The most composite dresses in this way come to consist at the lower edge of four pieces in front, four pieces at the back, and four pieces at each of the sides, sixteen pieces in all. It must not be supposed that the numerous narrow gores instead of a few wider ones indicate poverty or economy, or the desire to use up remnants. On the contrary, the many gores and seams were the height of fashion, as is clearly seen from the fact that when wider gores are used, they are regularly divided by means of false seams.

Sometimes the width of the gores increases more gradually, sometimes the side-gores are cut quite narrow at the waist and increase abruptly in width from the hips to the lower edge. In the latter case we have a costume that follows the lines of the body till below the waist and then falls in rich folds to the lower edge. The greatest width at the bottom is found in No. 41 which measures 4.25 m. A width of about 3.5 m. is not uncommon.

Placed either in the front side-gores or in the seams joining these to the front piece, on a level with the hips we often find a carefully bound slit, a "pocket-slit", which, as we shall see later on, is an important means of ascertaining the date of the costumes.

The neck-opening varies in width, but the costumes of this type are never high-necked. As a rule the opening is round and always deeper in front than behind, only in one or two cases does it seem to to be pointed (No. 58 and the child's frock No. 61). When it is not sufficiently wide, the front-piece may have a slash which may either have been laced (No. 39) or buttoned (No. 60), or closed with a clasp (No.43).

The sleeves are usually cut in one piece, only in one case in two halves (No. 33), apart, of course, from patches and repairs. A gore is, however, always inserted at the back of the sleeve by the shoulder to give the requisite width, and in No. 58 even two gores, one in a slash. The set of the sleeve is on the whole the weak point in the costumes which may otherwise have an astonishing elegance of outline. But as a rule the sleeve is too tight in front and too baggy behind, if we are not to suppose, that the wearers of all the dresses were hump-backed.

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[1] Open slashings at the front, back, or sides as they were commonly used in the Middle Ages especially in men's riding costumes, do not occur. Nor has it been proved that the owner of Herjolfsnes kept horses.

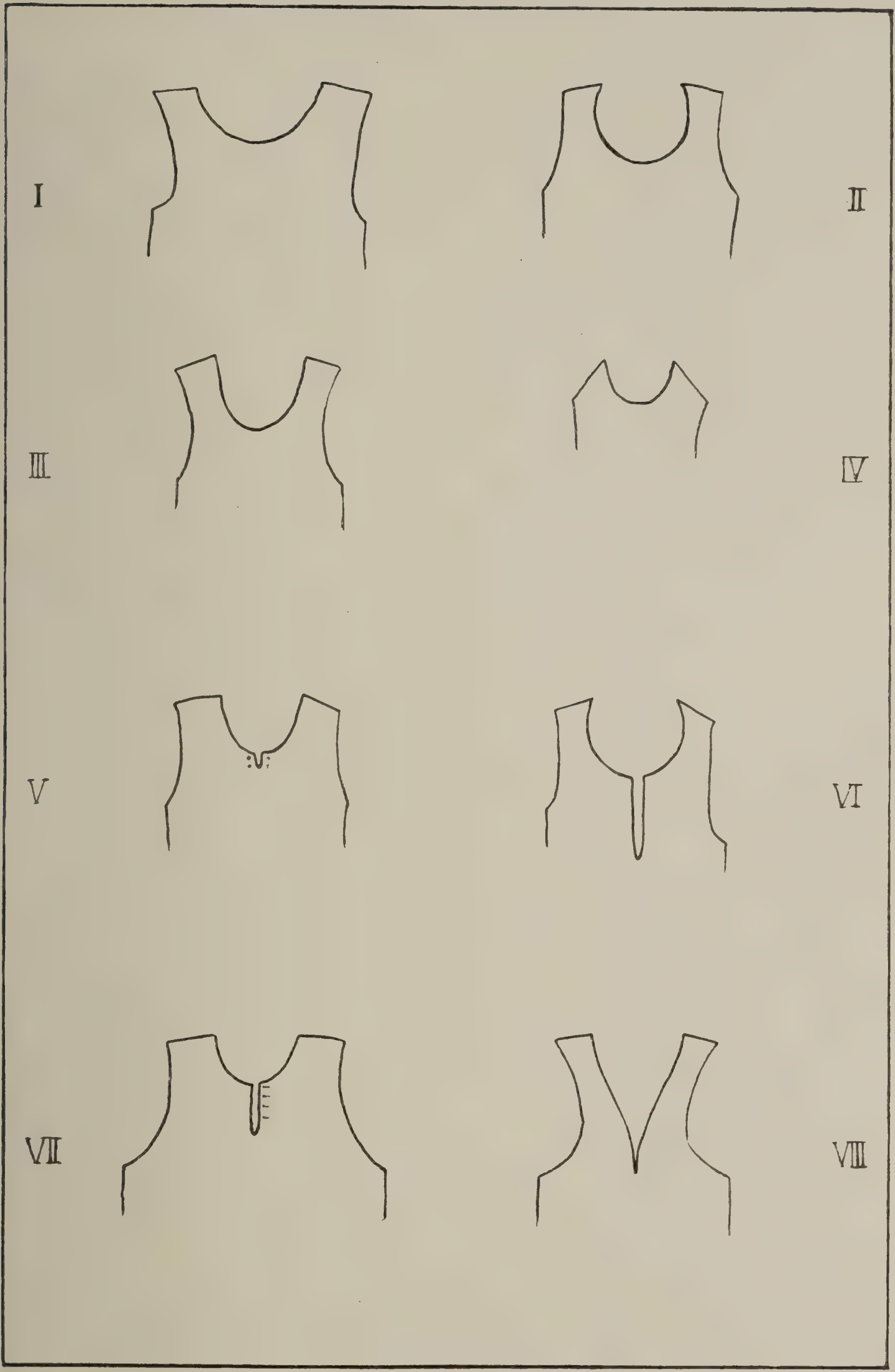

Fig. 58. Diagrams of neck-openings. ($^1/_{15}$).
I No. 33. II No. 41. III No. 38. IV No. 54. V No. 39.
VI No. 43. VII No. 60. VIII No. 58.

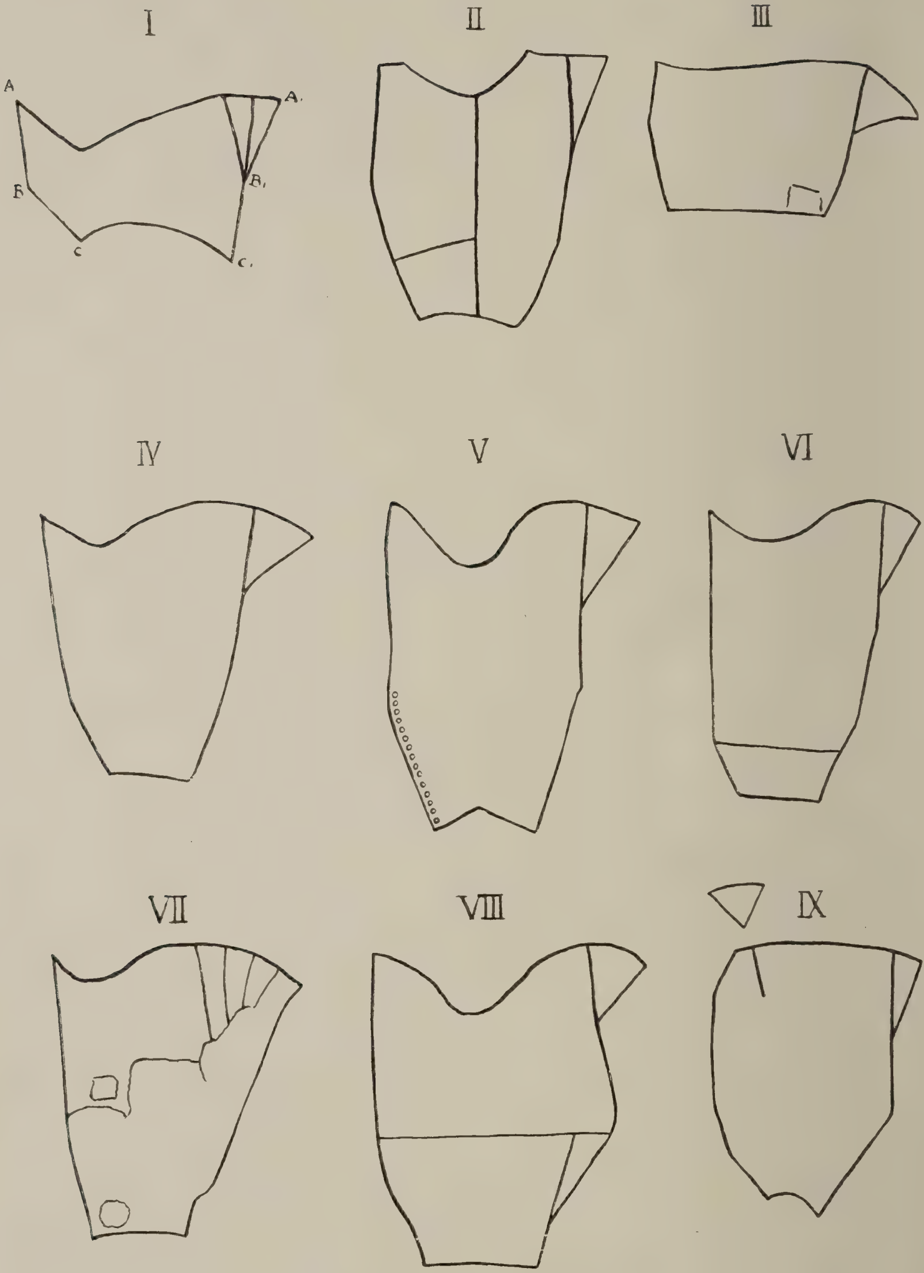

Fig. 59. Diagrams of sleeves. ($^1/_{15}$).
I No. 45. II No. 33. III No. 39. IV No. 38. V No.41.
VI No. 42. VII No. 43. VIII No. 63. IX No. 58.

Sleeves are both half-length (Nos. 39 and 45) and long. The width varies a great deal, but is always moderate. As a rule the sleeve is fairly close-fitting round the lower arm, but there is a slash at the wrist which cannot, however, have been left open. There are neither button-holes nor eyelet-holes so we must suppose that the slashes were sown together every morning, as we often find it mentioned in the saga literature.[1] Dress No. 41 has sleeves with a long slash to the elbow closed with fifteen closely placed buttons, several of which have been preserved.

Among the slip-over dresses must finally be mentioned two special types, of which, unfortunately, only fragments are left.

In one group the cut seems to correspond to the usual type, but slenderness of waistline has here been attained by a series of close, equally long, vertical pleats starting on a level with the middle of the arm-hole and stopping on a level with the hip. To this type belong Nos. 58 and 59. The latter seems to have had a small bodice or yoke.

Of the second type we have only a single piece, No. 60, to which may, however, be added the child's frock, No. 62. In contrast to the other slip-over dresses they have had no side-gores, nor are gores inserted in the front and back pieces, the whole of the increased width being thus obtained by the gores inserted at the centre of the front- and back-pieces.

Table of some Main Measures of Dresses, given in cm.[2]

No.	Width at the Waist	Width at the lower Edge	Width of Neck-opening	Width of Armhole	Length of Sleeve	Shoulderheight of Dress[3]
33	113	277	73	55	57	108
37	**156**	310		**66**		115
38	94	340	76	**66**	53	**119**
39	98.5	**360**	70.5	58		115
40	112	340	74	58		
41	100	**425**	**88**	63	**62.5**	**120**
42	98	**342**	**83**	45	56.5	115
43	92	230	79	58	58	108
44[4]	82	231	66.5	48		85
45	124	325	**87**	**68**		111
58				55	49	
60	110	166	45	**66**		
63	**140**	300	44	65	**62**	95
64	**136**	300	48			

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[1] Hj. Falk, Altwestnordische Kleiderkunde, p. 151.

[2] The largest figures in each column are given in heavy type.

[3] By this must be understood the length of the dress from the edge of the shoulder to the bottom hem. This figure is somewhat smaller than the total length of the front- or backpieces.

[4] Dress of a halfgrown person.

No. 60 has moreover a narrow neck-opening so that in this respect, too, it occupies an exceptional position among the slip-over dresses.

Of quite a distinct type, finally, are two dresses forming an independent group by themselves. They are not slip-over dresses but open in front, and are there buttoned across the chest with a row of closely-placed buttons. Because of their great width at the waist they must be supposed to have been worn with a belt. In the neck they are narrow and have a stand-up collar. They are cut in eight pieces which are all gored and of almost the same size, two front-pieces, two back-pieces, and two pieces at each side. The arm-hole is cut out of the side-gores, the neck opening out of the front and back pieces.

In the succeeding section we will now describe separately each dress or pieceof a dress. In order to give the reader some general idea of sizes we give, in p. 95, a table of measurements showing the main measures of the dresses which are sufficiently complete for such to be taken. In each column the largest sizes are given in heavier type, for greater convenience.

I a. Slip-over Dresses having no Centre Gores.

No. 33.†

Male gown exhumed at Kielsen's digging in 1840 and entered in the catalogue of the Museum as a shroud of wool (front- and back-piece and right sleeve) and "two long triangular pieces, possibly gores for a woman's dress". Later on the pieces were joined in a somwhat misleading manner and for the lacking sleeve were substituted pieces from another dress. It has often figured in literature on the old Norse culture (thus in Dan. Bruun, The Icelandic Colonization of Greenland p. 109), but in its present restored shape it looks a little more defective (fig. 60, to right).

The material is brown four-shaft twill, very heavy. It is cut in a front- and back-piece without any centre gores inserted, and two gores at each side (fig. 61, top, and fig. 58, I). Of these both the back-gores have been preserved, while the two front ones are missing except for a small remnant on the right side. Only the right sleeve is preserved and in a somewhat imperfect condition at the bottom; in contrast to all other sleeves that have been preserved, it consists of two halves besides the usual gore behind the shoulder (fig. 59, II).

The two main pieces increase slightly in width towards the lower edge; they are both cut with one side on the straight of the material. Apart from this the front piece especially is rather crooked. The greatest length of the pieces is about 1.10 m. The total width at the waist has been 1.13 m. of which the sidegores take up 27 cm., at the bottom 2.77 m., of which the sidegores measure 1.70 m.

The back-piece has hardly been rounded for the armhole, it is cut in an almost straight line from the shoulder to the bottom edge.

The length of the sleeve is about 57 cm., from which it may be assumed that the wearer had a shoulder-height of at least 1.30 m. so that the gown at the outside can only have reached to the middle of the shin. It is no doubt a man's dress. The width of the armhole is 55 cm., of the neck 73 cm., of which the back-piece takes up 35 cm. The preserved remains of seams are simply turned under. Otherwise there are no details of interest.

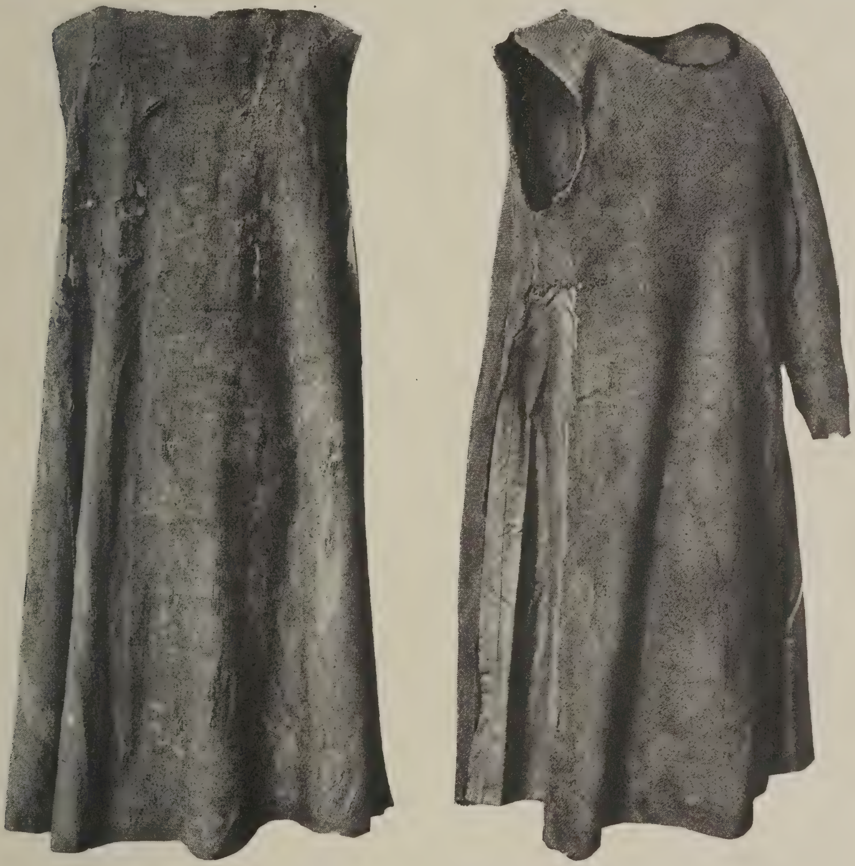

Fig. 60. No. 37 (from the back) and No. 33.
Male dresses.

No. 34.

Gown of very stout coarsely woven material, taken up north of the west end of the church above hood No. 72, at a depth of abt. 55 cm. below the old surface. Unfortunately it was in such a bad state that the idea of preserving it in future had to be given up; only one of the gores has been kept.

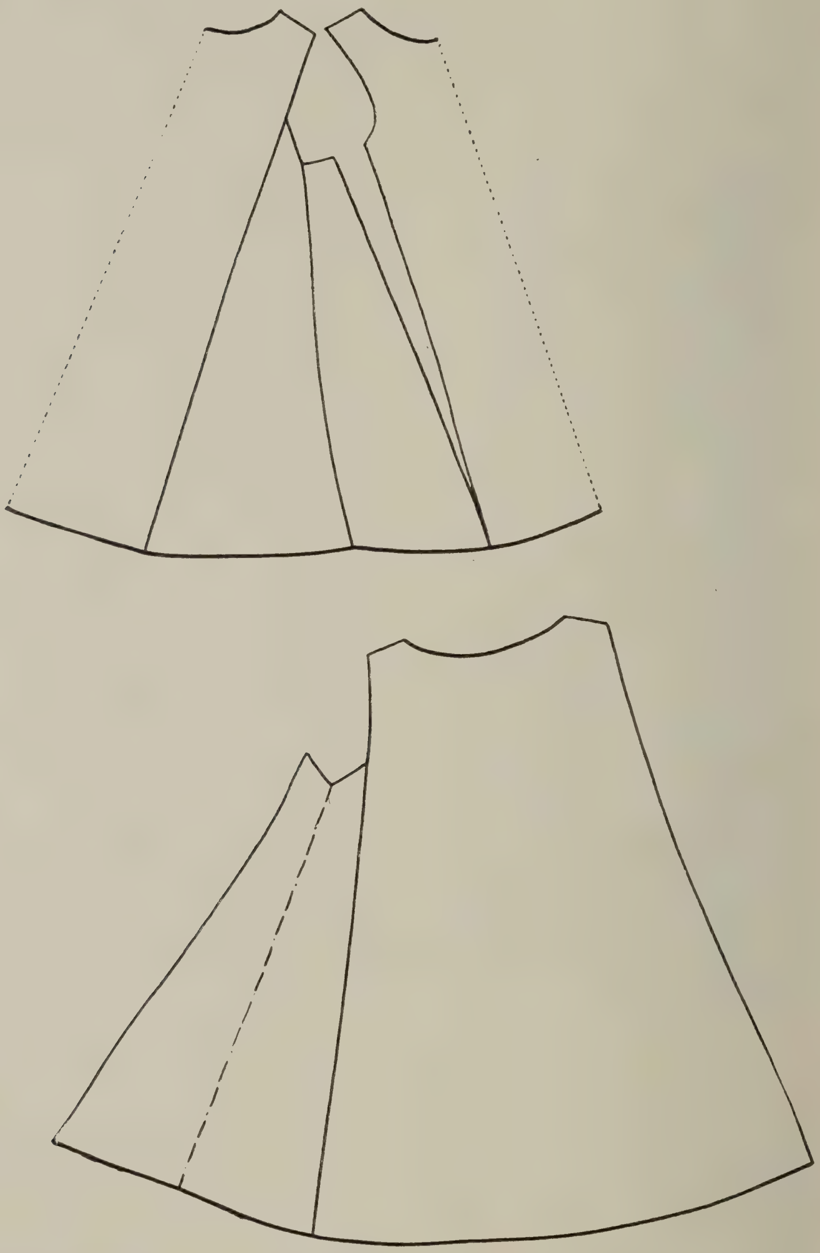

Fig. 61. Diagrams of No. 33 (right half) and of No. 37 (back and left side). ($^1/_{15}$)

The weaving is fourshaft twill. It is cut with a front- and back-piece increasing slightly in width towards the lower edge, but without centre gores; at each side there is a double gore, formed on the left side of a single piece with a false seam in the middle.

The width at the bottom is abt. 2.75 m. Both in width and cut and as regards the coarse material this gown shows close agreement with No. 33. Skeletal remains of a small and slight person having a distorted spine caused by rachitis; probably a woman, age 25—30 years, heigth 1.44 m. (Anatomical Section No. XIX).

No. 35.

Remains of a gown found abt. 98 cm. below the old surface, in the south-east corner of the churchyard on the top of hood No. 68, which again lay on the top of hose No. 93 and crosses Nos. 119 and 134. It was in such a bad condition that preservation was not possible. Well-preserved skeletal parts of a fairly powerful young man of abt. 1.58 m.'s height were found inside (Anatomical Section No. XXV).

The material is brown loosely woven fourshaft twill.

Cut: front- and back-piece without centre gores and probably two gores at each side. One of these has been kept as a sample. The front piece measured fully one meter from the neck to the lower edge.

No. 36.*

Remains of a shroud that could not be conserved. Found in the north-east corner of the churchyard at a depth of abt. 78 cm. below the old surface. Skeletal remains of an adult but small and slight person, most probably a woman (Anatomical Section No. XII).

The material was fourshaft twill with black warp and brown weft.

It could be made out that there had been a front- and back-piece which did not seem to have been slashed, further, two broad side-gores.

No. 37.

Parts of a man's gown (fig. 60, to left) found in the north-west corner of the churchyard at a depth of abt. 62 cm. below the old surface. Cut to pieces to serve as a shroud. The broad end of a gore was wrapped round the shoulders. The larger shroud reached to a little below the knees. The lower part of the legs was wrapped in a special shroud consisting of some chance remnants of coarse weaving. The skeletal remains indicate an adult individual of a calculated height of 1.53 m., most probably a man (Anatomical Section No. XXIV).

The material is darkbrown fourshaft twill well and regularly woven of firmly spun threads.

It must have been cut with a front- and back-piece having no centre gores, and a broad gore at each side divided down the middle by a false seam (fig. 61, bottom). Only the back-piece, the left side gore, and half of the right one have been preserved. There are no remains of the sleeves. The backpiece has several tears at the top and, along one of these, two rows of holes simply pierced with a knife. They must have served for laces by means of which the shroud was firmly secured (cp. No. 46).

The side gores increase gradually in width and are on the whole rather narrow. But the most remarkable fact about the gown is that the centre piece itself increases so much and so gradually in width towards the lower edge. This is unique among the slip-over dresses. The width of the backpiece is 48 cm. across the shoulders, 98 cm. at the bottom. The front-piece has presumably been of the same dimensions, and the total width at the lower edge will then have been about 3.10 m. At the waist especially it must have been comparatively large (abt. 1.56 m.). A piece of the righthand front-piece seam has been preserved, showing that there have been pocket-slits.

I b. Close-bodied Slip-over Dresses, having Centre Gores.

No. 38.

Longsleeved woman's dress (figs. 62, 70 and 86) found in the north-east corner of the churchyard at a depth of 70 cm. below the old surface, lying under No. 47 and largely penetrated by plant-roots. According to the anatomical determination the interred person was a small and slight woman of a height of 140 (or at the utmost 147) cm. Age 25—30 years. The bones, including the skull, were fairly well preserved (Anatomical Section No. II).

The material is fourshaft twill of medium stoutness, with black warp and brown weft, and not too closely woven for both colours to show.

Cut (figs. 63, bottom, and 58, III): front- and back-piece having two centre gores each (the backgores, however, are really only a single gore divided by a false seam in the middle); further, four sidegores at each side, but here, too, the two backgores on each side are really formed of one piece with a false seam down the middle though with a slit and a real seam at the top. The sleeves are long and slashed at the wrist; they are cut in one piece, with a long, narrow gore divided in two let in at the back (fig. 59, IV).

This is one of the most close-bodied dresses, the waist size being 94 cm. The width at bottom is 3.40 m. In spite of its present somewhat defective appearance it must have been a pretty and chic little dress. The most conspicuous feature about it is the shape of the sidegores. They are as narrow as bottle-necks at the waist and increase abruptly in width at the hips. All the centre gores are more or less pieced at the bottom. In each of the front side gores, on a level with the lower part of the sleeve, there is a pocket-slit edged with a thin, plaited cord of the kind shown in fig. 56. The sleeves which are both pieced with a narrow piece of material at the wrists — perhaps a real border — have an edging of the same cord which has also run along the slashes. At the bottom the dress has been edged with "false cords"

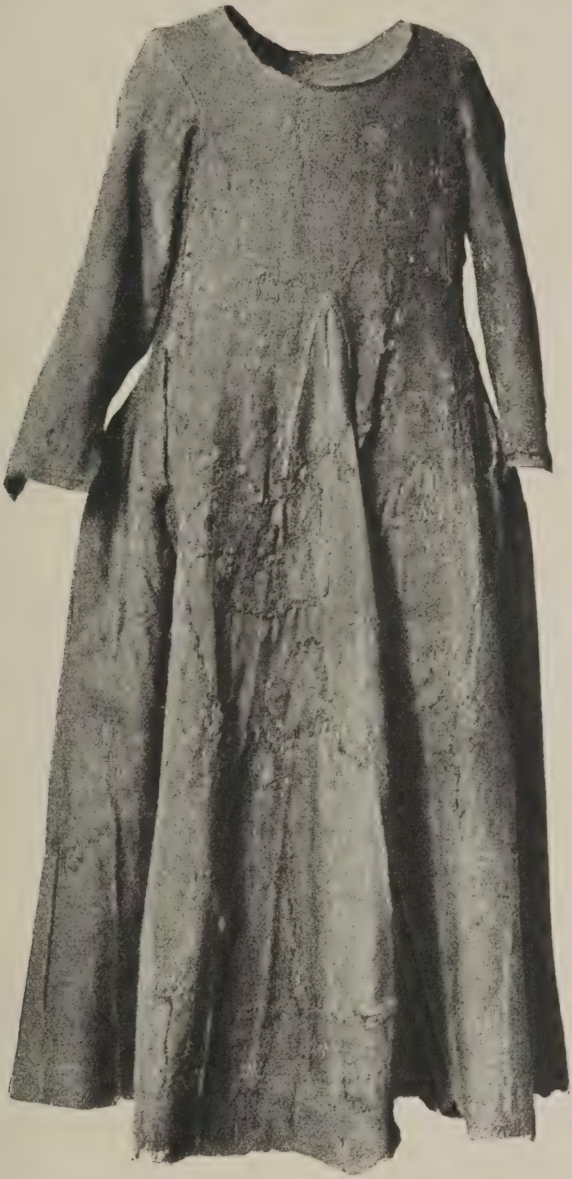

Fig. 62. Female dress No. 38.

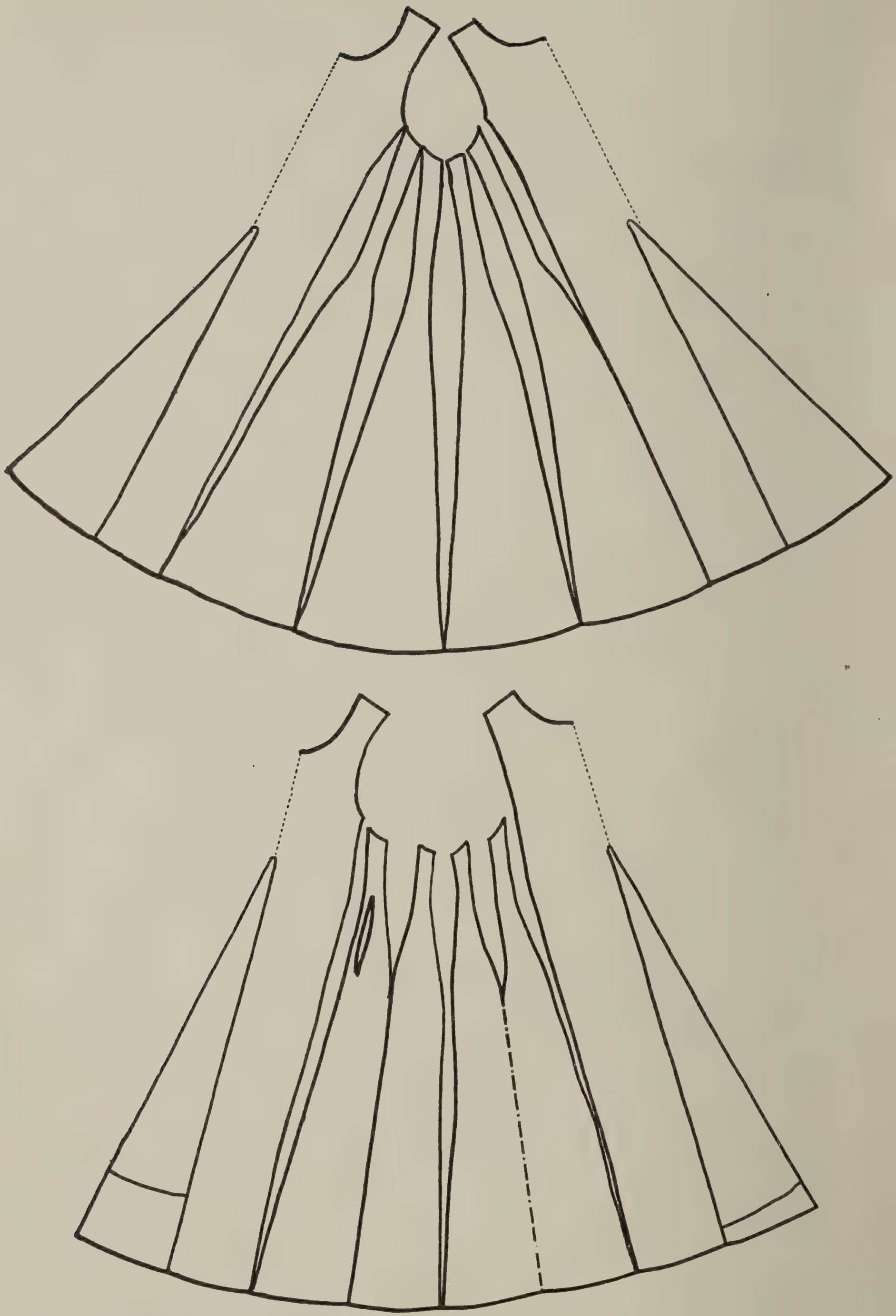

Fig. 63. Diagrams of Nos. 41 and 38. Left halves. ($^1/_{15}$)

i. e. embroidery on the top of the hem to represent cords. At the neck the edge has simply been turned under with a row of backstitches and the raw edge overcast. The seams joining together the sidegores are ornamented at the waist with a row of backstitches. The armhole is rather big, but the sleeve grows quickly narrower. The neck-opening is 76 cm. wide. The centre gores go rather far up.

The dress has not been patched, nor was it cut to pieces when it was to be used as a shroud. Its damaged condition is chiefly due to the pressure of the earth and the bones, especially those of the pelvis, and to the decay of the body, further to the superimposed interments and the exhumation.

No. 39.

Shortsleeved woman's dress (figs. 64 and 69) found in the north-east corner of the churchyard. It is the best preserved of all the dresses, rootfibres have practically not penetrated it at all, it was easy to take up immediately after the uncovering, apart from the fact that it was very heavy owing to the moisture with which it was saturated. On the top of it there were later interments with hoods Nos. 78 and 80 (wherein further the cap No. 86). Under it lay hood No. 77.

The bones were in this case fairly well preserved, even remains of decayed flesh were found on some of them. The anatomical examination (see below No. I) showed that the interred person was a slightly-built woman with a spinal curvature and a hump, probably as a result of some tubercular complaint, aged 30 or 40, and at the utmost 1.50 m. tall.

The material is firm and good, rather heavy, the weaving is four-shaft, the colour brownish. The weft has been so firmly worked in that the warp is hardly visible.

The dress is cut with a front- and back-piece having two centre gores let into each, besides two side gores at each side (fig. 68, bottom, and fig. 58, V). The left side, however, consists of one piece only, with a false seam down the middle. The sleeves are 30 cm. long, each made out of a single piece of material with a gore let in at the back (fig. 59, III).

The dress is fairly close-fitting, the waist size being 98.5 cm. At the bottom it measures 3.60 m. The side gores have almost parallel sides at the waist, but swing out abruptly from the hips downward, all four are pieced at the waist (cp. below). But also the front- and back-pieces narrow in at the waist in contrast to what is otherwise found. The width of the armhole is normal, viz. 58 cm. The neck is rather small, viz. 70.5 cm. There is a small slit in front, only 4.5 cm. long, with two pairs of quite fine, edged eyelet-holes. The centre gores divide at the top into two small separate points. There are no pocket slits. Both in the neck and at the bottom the edge is turned under, sown with a row of backstitches, and the raw edge overcast. On the sleeves, on the other hand, the edge is simply turned under.

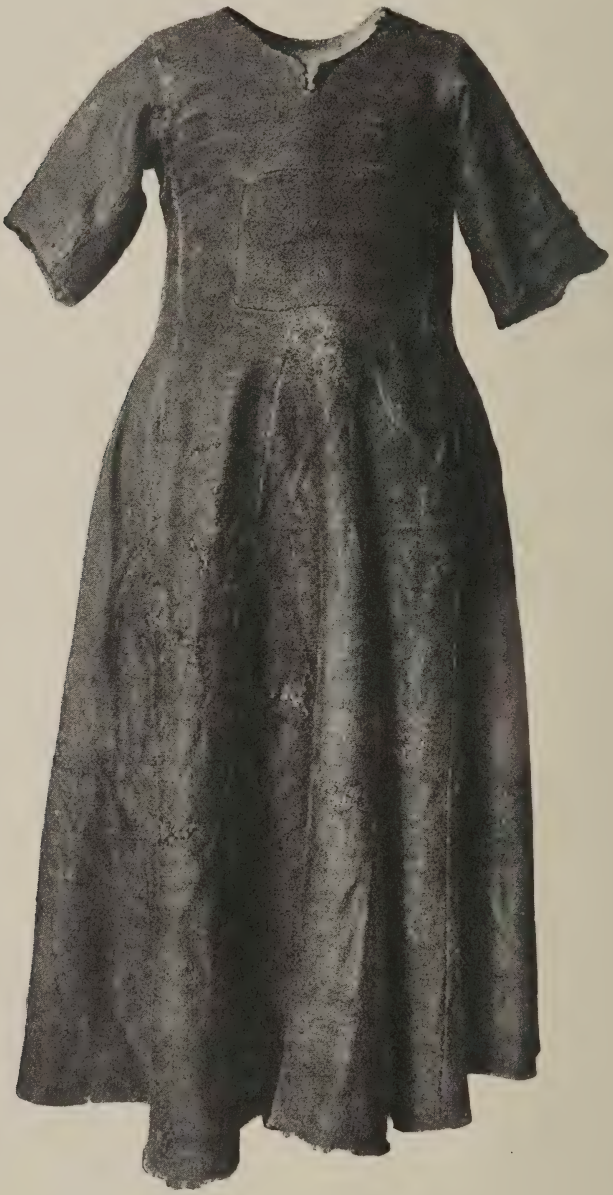

Fig. 64. Female dress No. 39.

From the beginning this has been a neat and well-made dress, and it is not much worn. As will be seen, however, on the left side of the breast a big square patch has been let in. The dress may have worn thin in this particular place, the wearer having perhaps had some work in which something pressed against it here. Perhaps the four patches at the top of the side-gores are connected with this, too; they are, at any rate, placed at almost the same level. There can be no question of wear caused by a belt as the patches are too high up, and there is no wear at the corresponding height at the back. It is a tempting conjecture, however, that these five patches have been inserted to adjust the dress to the figure of the deformed woman who was to wear it. The patch in front is broadest on the left side, while the opening cut for the patch had parallel sides.

The front-piece itself is cut about 5 cm. longer on the right side than on the left, and if it were not for the patch the difference would be still greater. As it is now, the dress drops very much on the right side in front, as will be seen in the illustration fig. 64.

At the interment the dress has been slipped over the dead body so that the arms have been kept inside, the sleeves being very rarely used in dresses that are utilised as shrouds. This custom has caused all the seams of the dress to burst at the waist, but otherwise it has not been damaged to serve its purpose. The heavy pressure of the earth from above and of the sharp bones, especially around the pelvis, from the inside, have caused a number of tears in the material.

No. 40.

Parts of a dress with a cap (No. 83) exhumed in the north-west corner of the churchyard at a depth of abt. 65 cm. below the old surface. There seems to have been a special wrap round the lower part of the legs, but it was too much dissolved to be taken up. Immediately above this dress the entirely dissolved remains of another interment without any preserved shroud were observed, and on the top of this again lay the man's gown No. 63. Under No. 40 were found a couple of bones from an earlier, disturbed, interment, and at the bottom the rune cross No. 137.

The skeletal remains have been dealt with by Professor Hansen in the Anatomical Section No. XX. They indicate a slightly built adult person of about 25 years of age and about 145 cm. tall. Both the shape of the pelvis and of the femur point to a woman. This is one of the few cases in which the anatomical and archæological investigations are with difficulty brought to agree. The cap is presumably that of a male, and also the character of the dress itself (below p. 138 seq.) seems to support this supposition. But the male features of the costume are not very distinctive, and we dare not deny the possibility that the wearer was a woman, for instance a poor servant-maid from the farm.

The material is fourshaft twill, fairly heavy, the warp being black, the weft dark-brown.

The cut is: a front- and back-piece slashed up in the middle from the bottom, each with two gores let in; further, two sidegores at each side, on the left side, however, judging by the preserved remnant, there has really only been one gore divided down the middle by a false seam.

The dress was close-bodied. Like No. 39, but in contrast to what is generally found, both the front- and the back-piece sway slightly inward at the waist. The close-bodied effect is, however, chiefly due to the sidegores, which have almost parallel sides at the waist, but increase to great fulness at the hips, where also the comparatively short centre gores begin and the main pieces cease swaying inward. The great increase in fulness continues till below the loins and then becomes more gradual. The entire circumference of the dress at the lower edge has been abt. 3.40 m. of which the side gores together take up abt. 1.85 m. The size at the waist has been abt. 1.12—1.15 m. of which the side gores take abt. 35 cm.

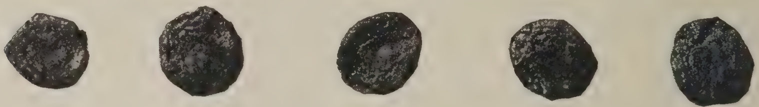

Fig. 65. Buttons for the sleeve of No. 41.
Natural size.

The back-piece has hardly been cut out for the armhole the entire width of which is abt. 58 cm. The opening for the neck is rather small, abt. 74 cm.

The dress does not seem to have had pocket-slits. All hems, both at the neck and bottom edge are gone. Most seams had come undone and were joined together again when the dress was restored. As so much of the gown was missing, it was not attempted to put together the remaining pieces on a lining. In the first place both sleeves and most of the gores on the left side are entirely gone. The front side gore on the right side has had a big patch, but now only the hole remains! Finally most of the left lower half of the front piece is missing as well as the centre gore joined to it.

No. 41.

Longsleeved man's dress (figs. 66 and 69), taken up in the northwest corner of the churchyard at a depth of abt. 62 cm. below the old surface. The skeletal remains were fairly well preserved and indicate an adult individual, rather powerfully built, fully 1.60 m. tall (Anatomical Section No. XI). The height is somewhat less than might be supposed from the dress. Curiously enough the skull was not preserved.

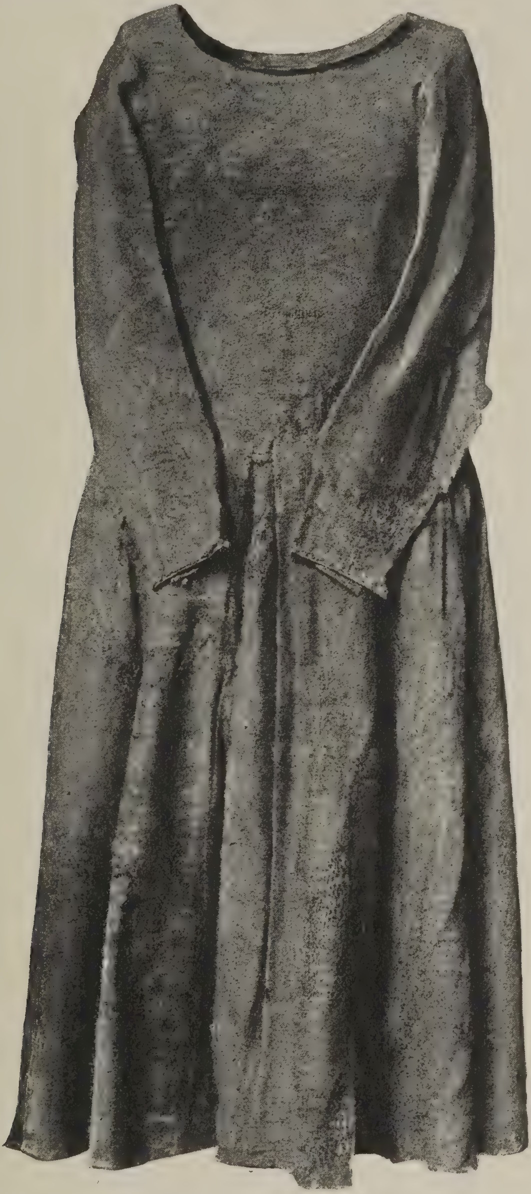

Fig. 66. Male dress No. 41.

We must suppose that it was removed on a later occasion as there were no less than three layers of interments above, the lower one adhering to this dress. All had shrouds, but in such a state of decomposition that they could not be taken up.

The dress reached to the knees of the body, and its sleeves were crossed over the breast (fig. 43), but the arms of the dead person were not in them. As usual, they were inside the dress itself which had been cut open in the back to make room for them. The right arm was bent in a right angle with the hand on the breast, the left arm lay along the side.

The material is fourshaft twill, rather thin, darkbrown but with a slightly paler weft than warp. It is cut in the usual way (fig. 63, top, and 58,II) having a front-piece and a back-piece, both slashed and with two gores inserted in the middle, the top points of which terminate in two separate points. Further, there are four gores at each side, and long sleeves, each made of one piece with a gore let in at the back of the shoulder (fig. 59, V).

The dress is of course more or less damaged, not least on account of the unusually thin material whose threads have burst in numerous places, chiefly owing to the pressure of the sharp bones of the pelvis. The left centre gore from the back-piece is entirely gone, and the middle part of the right-hand side gore is missing. Finally a big piece of the right sleeve is missing, and the wrist-part of the left one.

But in spite of these deficiencies this dress is one of the most interesting ones. It is distinctly close-bodied, the side gores being quite narrow at the waist (4 cm.) and increasing abruptly in fulness at the hips on a level with the place where the centre gores begin. The centre gores are unusually short. The waist measures 1 m., the lower edge 4.25 m. or in other words it is by far the fullest of all the dresses. It must have been very ample round the hips and have fallen in rich folds towards the bottom. Where the seams of the side gores come close together at the waist they are ornamented with a row of backstitches that make them very conspicuous.

The neck is 88 cm., the armhole is 63 cm. wide. The sleeve is rather full and has a length of 62.5 cm. From the elbow to the wrist there have been fifteen closely placed buttons, of which six in all are preserved from both sleeves. They are covered with material, and the interior, too, consists of material which has been glued together (microscopic examination by Professor B. Gram).

In the neck the material is simply turned under and the raw edge overcast. The long slash in the sleeve is further decorated with a row of backstitches and the bottom hem with two such rows.

No. 42.

Dress, most probably a man's, dug up west of the church at a depth of abt. 62 cm. below the old surface (fig. 67). This was the first well preserved dress found during the excavations. It lay just beside the pleated dress No. 58, which slightly overlapped it and must thus be from a later interment — perhaps one day perhaps a hundred years

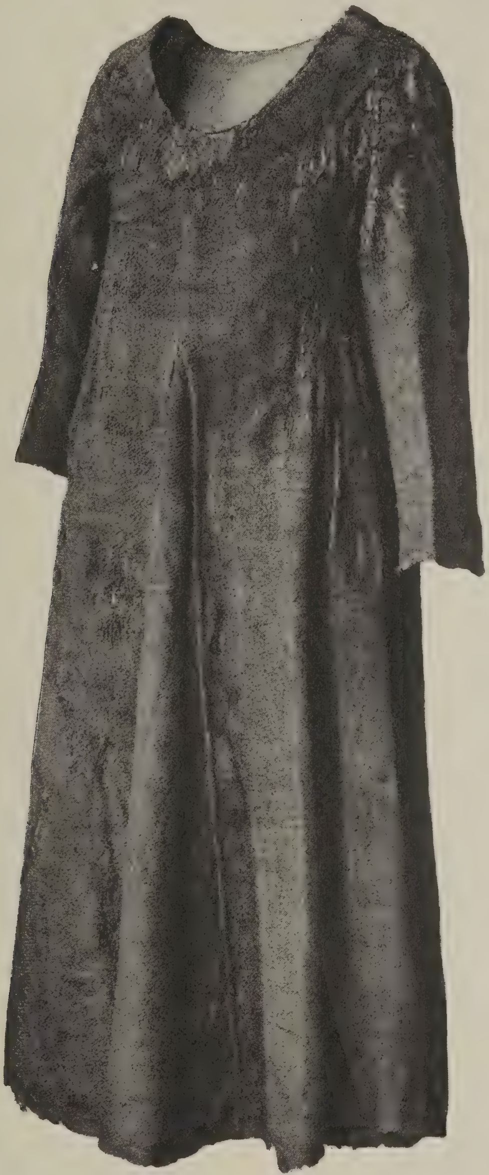

Fig. 67. Male (?) dress No. 42.

later, as we shall see, most probably the latter. The sleeves were crossed over the breast and the full skirt was carefully laid in pleats over the legs, but of the body nothing but a clayey sticky mass was left.

The material is rather heavy fourshaft twill. The warp is almost

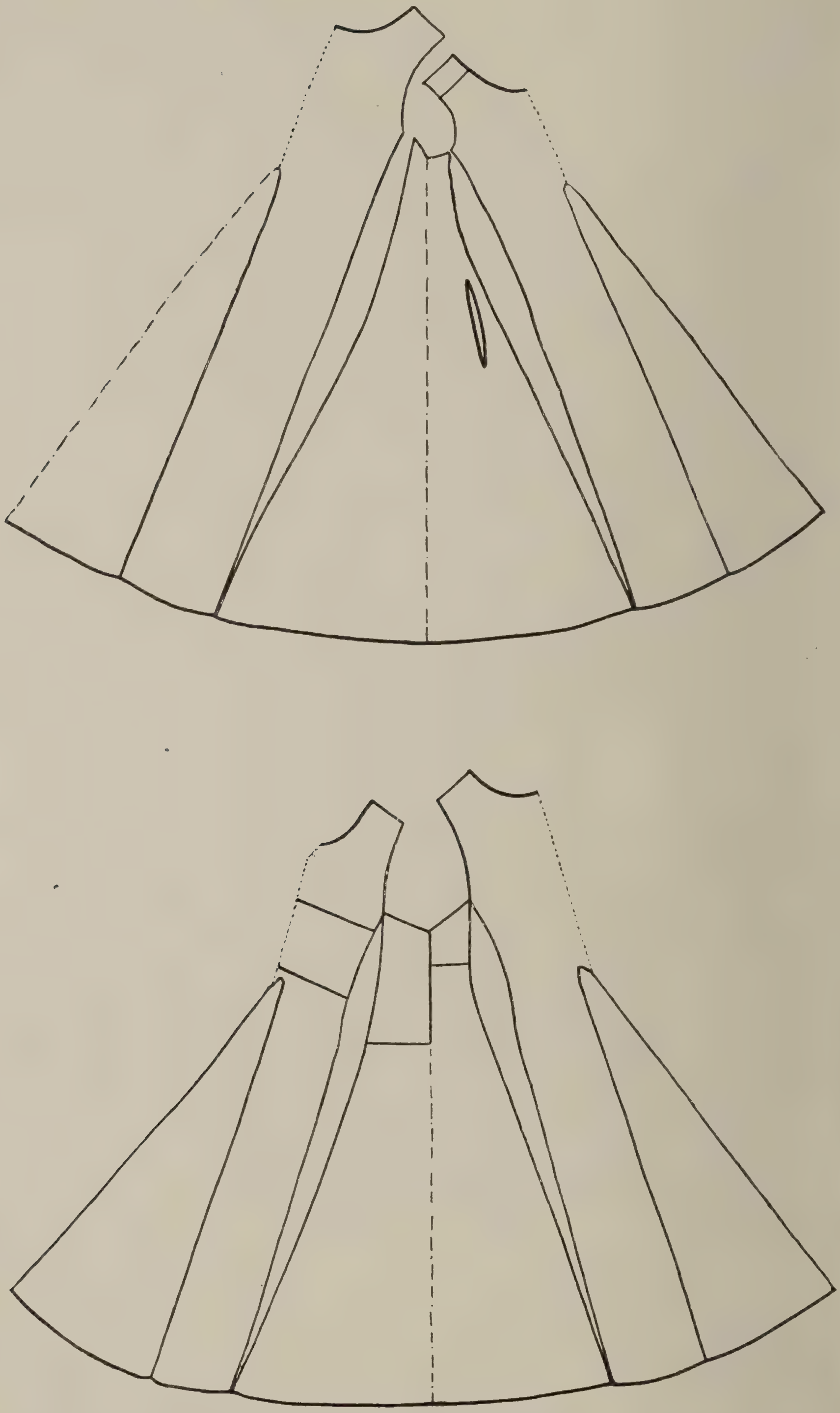

Fig. 68. Diagrams of Nos. 42 (right half) and 39 (left half). ($^1/_{15}$)

black, the weft brownish, the total impression is of a rather blotchy darkbrown.

The dress consists of a front- and back-piece slashed in the middle and with two gores inserted (in the back-piece really one gore, divided down the middle by a false seam). Further, two big side gores at each side, though here again on the right side it is only one piece divided in the middle by a false seam, the whole piece being 83 cm. wide (fig. 68, top). Finally, there are long sleeves to the dress, each cut of one piece with the usual little gore let in behind the shoulder (fig. 59, VI). The right sleeve has had a piece added at the wrist which is now unfortunately

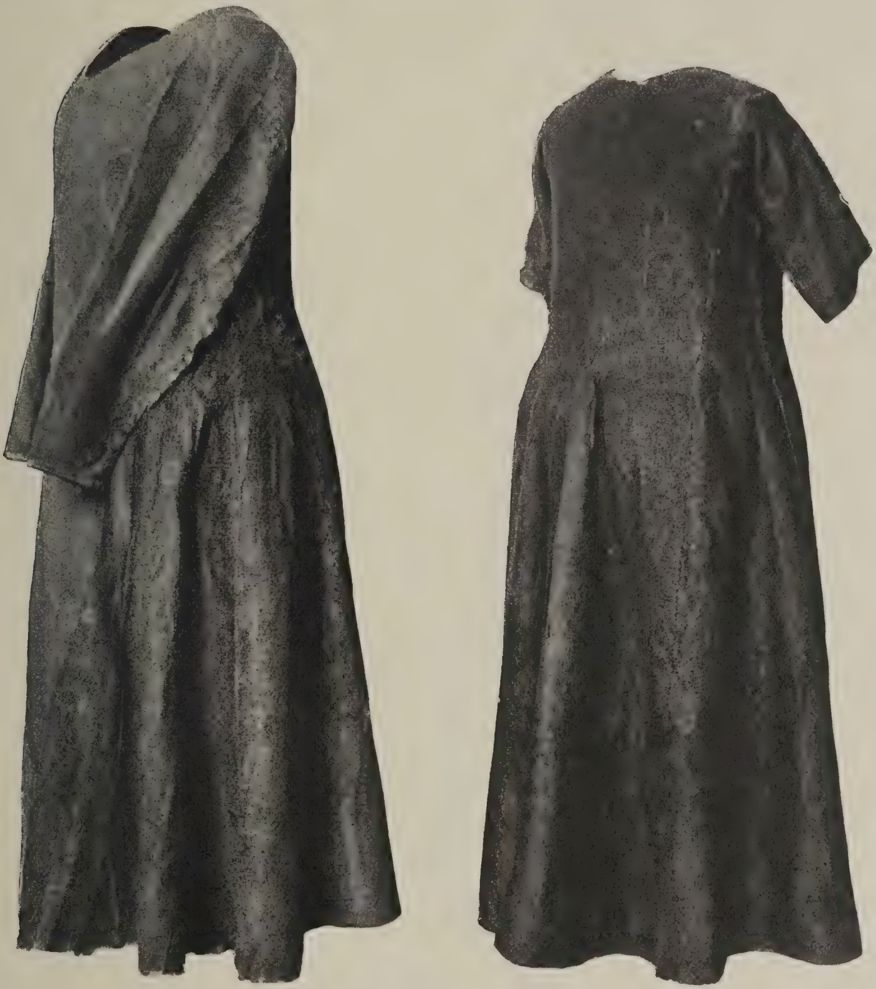

Fig. 69. Nos. 41 and 39. Side-wiews.

missing. In the same way, the front has been pieced at the shoulders with abt. 5 cm., and the left side gore at the back has also been pieced.

The dress is preserved in its entirety, except for the piece just mentioned, and was taken up whole with the seams joined together. It was neither cut to pieces nor unpicked. Nevertheless its state of preservation leaves much to be desired. As already mentioned the body was quite decayed, and during the process of putrefaction, the bodice of the dress has suffered much. As a rule the warp has been preserved but the weft is missing. The front-piece has been best preserved, though a piece is missing in a very conspicuous place at the neck. In the sleeves, and especially in the lower gores, the material is quite good.

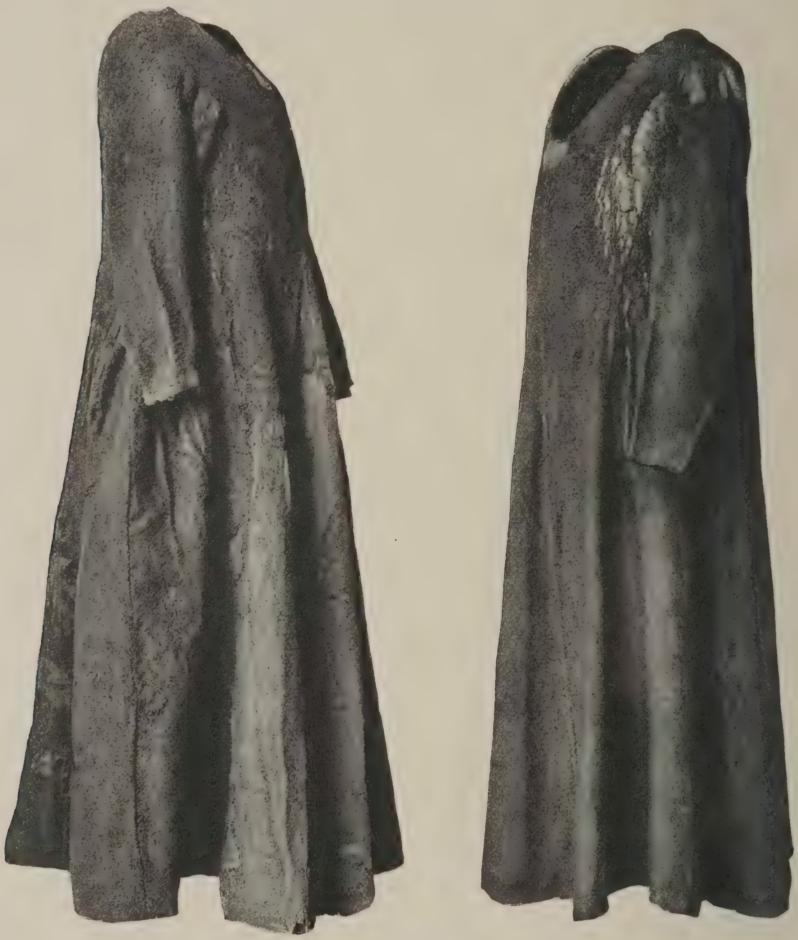

Fig. 70 Female and male dress. Nos. 38 and 42.

A remarkable feature about this dress is that the back-piece is much larger than the front-piece. It is 10 cm. longer (1.25 against 1.15 m.) so that, when worn by a normal individual, its shoulder seams come too far forward on the shoulders. That at the waist, too, it is the larger of the two pieces, is less unusual. At the bottom the two pieces have almost the same width.

The dress is distinctly close-bodied. The size at the waist is 98 cm., a comparatively small size. At the lower hem it is 3.42 m. It is worthy of note that this great width has been obtained although there is only a single gore at one side which, however, increases in width from 10 cm. to 83 cm.

The opening for the neck is rather large (83 cm.) while the armhole is very small (45 cm.) and the sleeves are narrow in their entire length. At the wrist there is a slash 13 cm. long. When it was closed, probably by being sown up, the sleeves must have been quite close. The hems at the wrist are only 17 cm. The length of the sleeve is 56.5 cm.

In each of the front side gores there is a pocket-slit 16 cm. long. Its lower end is only 55 cm. from the bottom hem. The pocket-slits and the neck are edged with thin plaited cords of the type shown in fig. 56 and the bottom hem is edged with a quite simple cord twisted of two threads and sown on in overcasting. The sleeve slit has a single row of backstitches and the raw edge is overcast.

The dress gives one the impression of having been a stylish garment. It must be assumed most probably to have been a man's as, judging by the length of the sleeve and the position of the pocket hole, it seems to have reached only to the middle of the calf. (Cp. p. 139 seq.).

I c. Loose Slip-over Dresses having Centre Gores.

No. 43.

Man's gown (fig. 72) found in the north-west corner of the churchyard at a depth of only 55 cm. below the old surface, penetrated by numerous root fibres. It does not belong to the latest interments as Nos. 60 and 85 lay on the top of it in such an irregular way that there can be no question of a simultaneous interment. No.49, with cross No. 151, was found below it. According to the anatomical determination the buried person was an adult individual of 25—30 years (cp. Anatomical Section No. VII).

The dress must undoubtedly be a man's. In the first place because there is a hood belonging to it (the only case in which a hood has been found together with a gown), and the hood in the shape in which it was found at Herjolfsnes is exclusively or almost exclusively a male article of clothing. In the second place the gown is rather short compared with the length of the sleeve, and not very full towards the lower edge. Besides the hood and gown, some rags were found wrapped round the right leg which subsequently proved to belong to the right sleeve. Traces of bones of the left leg without any wrappings were observed.

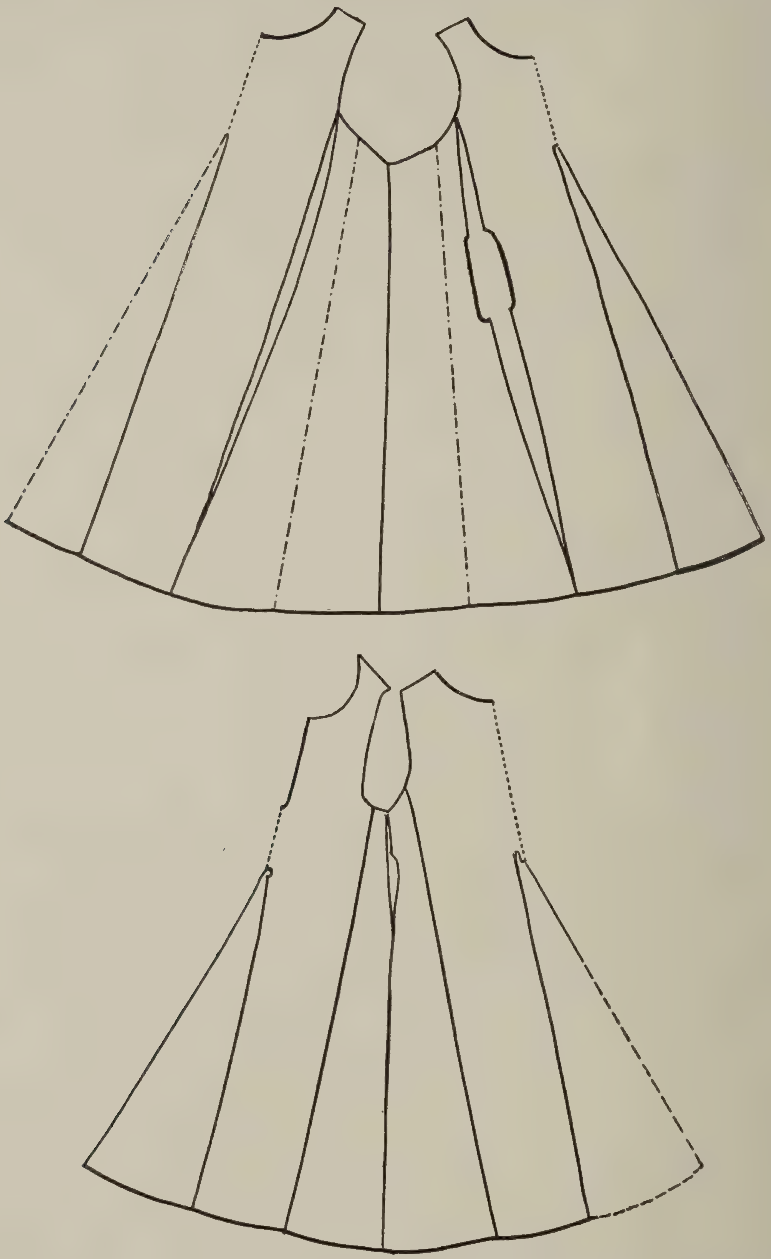

Fig. 71. Diagrams of two male dresses, Nos. 45 (right half) and 43 (left half). $({}^{1}/_{15})$

The hood, which is of very coarse material, and whose tail has been torn off, will be specially described under the hoods (No. 76 below).

The material of the gown is of fourshaft weaving, rather thin, brown in colour, having a darker warp and a paler weft.

It is cut with front- and back-pieces which have two gores inserted in the middle, and with two side gores at each side (fig. 71, bottom). The sleeves are one-piece, apart from patches, with gores let in behind the shoulders (fig. 59, VII).

The dress is slender, but not close-fitting in so far as none of the gores curve inward. The size at the waist is 92 cm., at the bottom the width is abt. 2.30 m., and both these sizes are the smallest that occur among the slip-over dresses for adults. The armhole is 58 cm. wide. The most striking peculiarity about the gown is its deep breast opening, 18 cm. long; it must have been kept together by a clasp as no eyelet-holes or buttonholes are seen (fig. 58, VI). The gown is 79 cm. in the neck. The centre gores which are unusually short are not joined together in one point at the top, but sown up in two separate points. Under the arms there are slits between the two side gores which, however, differ very much from the usual pocket-slits. In the first place they are on a level with the elbow (7 cm. below the armholes) and in the middle of the side piece, i. e. very much higher up and farther back than usual, an unpractical and inconvenient position. In the second place there can be no doubt that a belt has been worn with this gown as there are very plain marks of the wear caused by it exactly on a level with the slits, and the belt must thus have rendered them useless. In spite of these doubtful pocket-slits the dress must thus probably be assumed to be a slip or undergown.

The lower edge is not turned under. The edges of the sleeves and the neck are turned under but there is no stitching or overcasting. The slits under the arms are not hemmed.

From the preceding description it will appear that from the beginning this was no very fine or carefully made dress. To this must be added that it is very much the worse for wear. Besides the wear caused by the belt there are thin places round about, and great patches, especially in front. At the left lower edge of the front piece there is a big patch. The thought inevitably suggests itself that a sword may have dangled there. The sleeve is also badly patched, in part with patches of another colour. Some of the patches found inside the dress it has not been possible to place.

Finally the dress was damaged when it was employed as a shroud. The sleeves were torn off so that only a few rags were left and, as already mentioned, one of them was wrapped round the right leg. Most of the lower portion of the back-piece was also torn off with its two gores.

No. 44.

Dress for a big girl presumably abt. ten years of age, exhumed in the western part of the churchyard. It was much penetrated by root fibres, and on the whole it was not in a good state of preservation. The material was loose and crumbling, nevertheless an entire garment has now been successfully put together from the rather decayed fragments (fig. 57, to right).

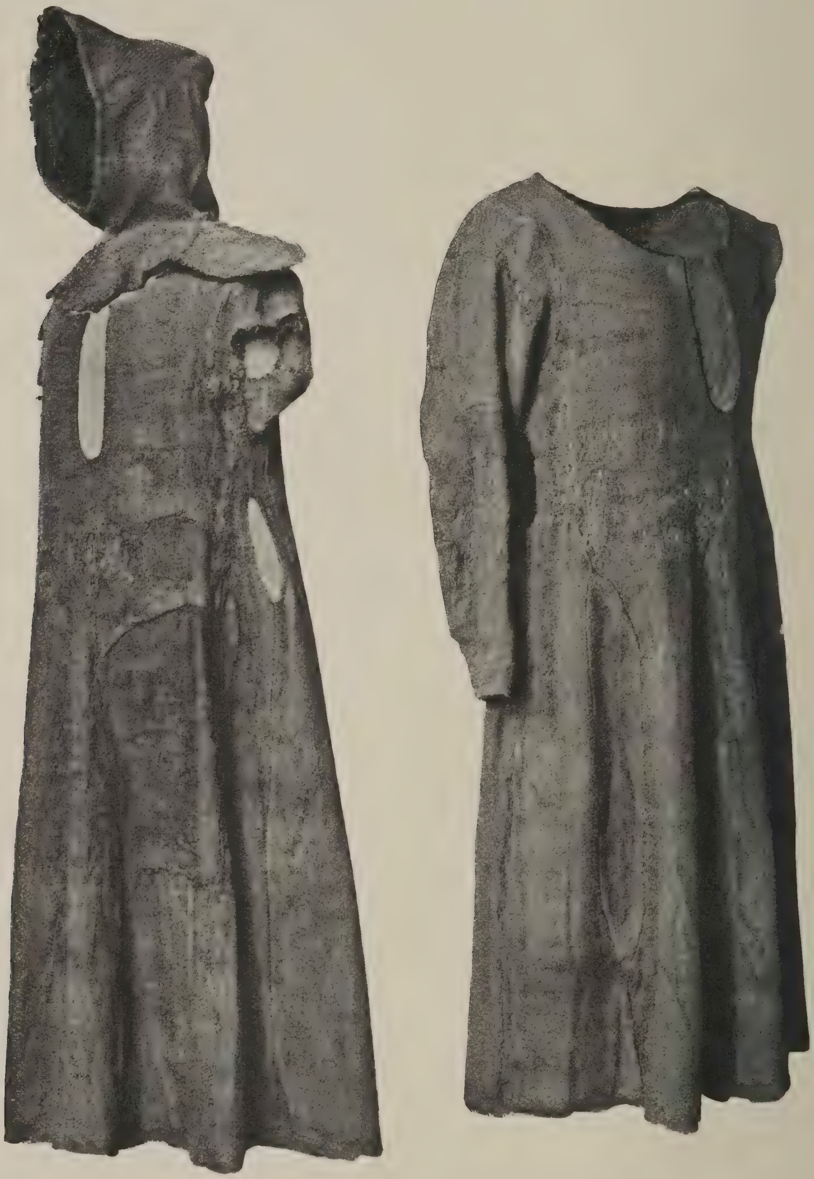
Fig. 72. Two views of the male gown No. 43.

The material is fourshaft weaving of a strong brown colour and rather a heavy quality.

It is cut in the usual way with front- and back-pieces, each with two centre gores inserted, and having two side gores at each side (fig. 78, bottom). The sleeves are in one piece and must have had a gore let in at the shoulder, but it is now missing in both sleeves. They are slashed at the wrists.

The dress is not close-fitting. Its width at the waist is abt. 82 cm. and increases gradually until it is 2.31 m. at the lower edge. The side gores are rather wide at the top. The seams are all gone. The armhole measures 48 cm., the neck 66.5 cm.

No. 45.

Shortsleeved man's dress (fig. 73 and fig. 57 to left) found in the north-east corner of the churchyard at a depth of abt. 1.10—1.15 m. below the old surface. The greater part of it lay at the top of a quite disordered heap of rags and bones with its lower portion wrapped round a skull. Considering its position it is doubtful whether the dress originally had any connection with the skeletal remains exhumed with it. These are described by Professor Hansen as belonging to an adult, fairly powerful, individual having very large hands (Anatomical Section No. V), a description that tallies well with the impression given by the dress itself. Among the pieces lying under it there was one well preserved hood of the latest type (No. 79). The next day the right side piece of the same dress was found below No. 46 a couple of meters further to the north together with a pair of long-legged hose (No. 88) presumably belonging hereto, and finally the left shoulder pieces were found in a heap of rags lying close to hood No. 78. All the separate pieces have now been put together producing an almost entire garment.

The material is very heavy and coarse fourshaft twill, and in the main gives the impression of being black, but the weft-threads often have a brownish tint. The dress (fig. 71, top) consists of front- and back-piece both having a fairly long slash from the lower edge upward in which a double gore has been inserted. In the front-piece there are really two gores whilst there is only one with a false seam down the middle in the back-piece. Further there are two large sidegores at each side, divided down the middle by a false seam; the left side, however, consists only of a single piece divided by three false seams. It shows the material to have been at least 82 cm. wide.

Only the right sleeve has been preserved. It is half-length and frayed at the edge, still there are a few remains of a hem showing the length. It is a one-piece sleeve with a pointed double gore inserted at the back (fig. 59, I). It is very wide at the armhole but narrow at the lower edge.

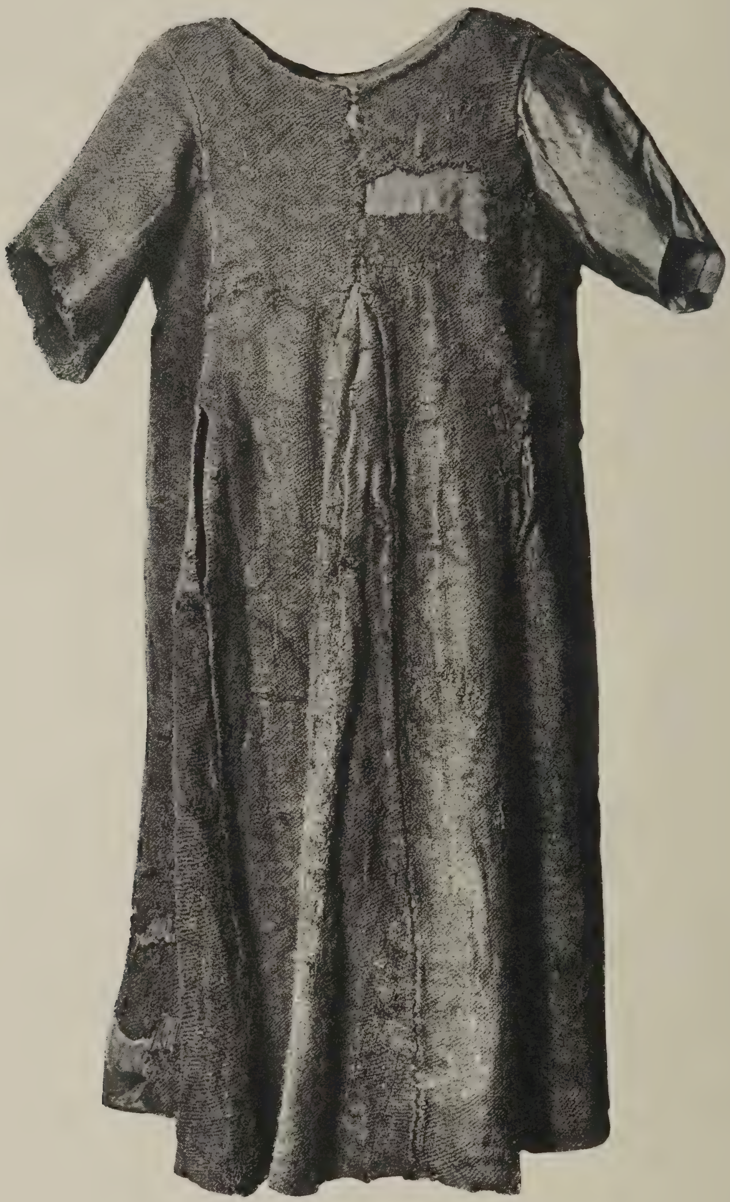

Fig. 73. Male dress, No. 45.

The left half of the back-piece is very incompletely preserved, but apart from this, and except for the left sleeve which is completely gone, there are only small pieces missing here and there. The material itself is well preserved and unusually strong, and the seams, too, are preserved. They are carefully overcast but not ornamented as in the other dresses. On the whole the dress is of good solid make, but without any sort of refinement—coarse like the material of which it is made. Between the front-piece and the front sidegores there are pocket-slits, with the raw edge turned under and overcast.

The dress is remarkable for its large-sized waist — 1.24 m.; the width at the lower edge is 3.25 m. It gives one the impression of having been worn by a very stout person. On account of the pocket-slits we cannot suppose that there has been any belt. The neck measures abt. 87 cm., the armhole 68 cm., and these sizes, too, are larger than normal.

Compared with the other unusually large measures the length of the dress is remarkably short. The front-piece is 1.17 m., with a centre slash of 87 cm. It is thus much shorter than the average, but answers exactly to the much scantier man's dress No. 43. Further, the small distance between the lower end of the pocket-slit and the bottom hem must be noted (58 cm.). As the pocket-slit cannot well have been lower than the loins, the dress has hardly come down lower than the middle of the calf. This shows that most probably it has been a man's dress.

No. 46.*

A very dilapidated shroud wrapped round the body of a young, very small and slight woman, only 1.38—1.40 m. tall (Anatomical Section No. XV). Found at a depth of abt. 70 cm. below the old surface in the north-east corner of the churchyard on the top of the long-legged hose No. 88 belonging to the man's dress No. 45. Preservation was not possible.

The material was closely woven brown fourshaft twill. The following parts of the dress were found: a back-piece with two centre gores and four gored side pieces one of which was divided length-wise by a false seam. It may then be taken for granted that each side has been divided in four. The dress does not seem to have been close-fitting. In the upper part of the back above the slash there was a double row of holes pierced with a knife. Most probably they date from the interment and must in some way have served as eyelet-holes (cp. No. 37).

No. 47.*

Dress found in the north-east corner of the churchyard above dress No. 38 at a depth of abt. 65 cm. below the old surface. As its upper portion was in a very bad condition and most of the front was missing, preservation was given up. The skeletal remains indicate an adult woman past 30 (Anatomical Section No. XXIII).

The material was fourshaft twill with a black warp and a brown weft. It was cut with a front- and back-piece each with a centre gore divided by a false seam, and at each side a single broad gore divided down the middle by a false seam. In the seam between the front-piece and the side gores there was a "pocket opening" with a seam carefully sown with backstitches and the raw edge overcast. The lower edge was simply turned under and overcast. Width at bottom abt. 2.75 m. The dress has scarcely been close-fitting.

No. 48.*

Parts of a dress found in an overturned heap west of the church in a layer above hood No. 81 (at a depth of abt. 45 cm. below the old surface). Unfortunately it was so dilapidated that it could not be preserved.

There were about three parts of the lower gores of a small dress for a half grown child. It was of the usual cut: a slashed back-piece with two small centre gores (the front-piece was missing), two wide gores at each side, those on the right consisting of a single piece divided by a false seam. No sleeves were preserved. The length under the arms can only have been 60—65 cm.

The edges were turned under and the raw edge overcast.

No. 49.*

Dress found north-west of the church at a depth of abt. 65 cm. below the old surface, under the man's dress No. 43 which was again covered by Nos. 60 and 85. It had been cut up to serve as a shroud and was in such a bad condition that it could not be preserved. On the breast, under the clothes, was found the fine cross No. 151. On the skeletal remains, which belonged to an adult, see the Anatomical Section No. XIV.

The material was fourshaft twill with black warp and brown weft. A front- or back-piece was made out, abt. 33 cm. wide, and 1.10 m. long from the lower edge to the neck which had a carefully felled seam. It was slashed and two narrow gores, 86 cm. long, had been let in, each measuring 17 cm. at the bottom. Two well preserved pieces lying at the upper part of the dress may possibly have formed a half-length sleeve. On another rag, presumably from a side gore, a false seam could be seen.

No. 50.*

Remains of a dress found in the western part of the churchyard at a depth of abt. 52 cm. below the old surface; they were penetrated by an unusual number of roots. The skeleton was quite dissolved but could still be distinguished in the earth. The dress only reached to the middle of the thighs. The head was covered, too.

The find was in such a bad condition that it could not be preserved. The material was a thin brownish fourshaft twill. The component parts were a front- and back-piece with two gores let in at the bottom of each, further two broad side gores at each side. The dress cannot have been close-fitting.

No. 51.*

Remains of a dress cut to pieces to serve as a shroud, unfortunately in such a bad condition that preservation was impossible. Found in the north-west corner of the churchyard on the top of No. 52, but under hood No. 71, at a depth of abt. 65 cm. below the old surface. On the skeletal remains of a small but adult individual found therein, see Anatomical Section No. XIII.

The material was brown fourshaft twill. The cut: front- and back-pieces, both slashed, and with a gore 62 cm. long, divided down the middle by a false seam. This means that this gore comparatively speaking is the shortest that occurs in any of the dresses, the length from the shoulder seam to the lower edge being 1.12 m. It could not be determined whether there had been side gores.

No. 52.

Some badly preserved remains of a dress with many seams and narrow gores found in the north-west corner of the churchyard under No. 51 and hood No. 71, at a depth of 70 cm. below the old surface.

The material was ordinary brown fourshaft twill. Only part of the lower portion of the dress, comprising four different gores, was preserved.

No. 53.*

Back-piece of a dress from the north-eastern part of the churchyard. The material was fourshaft twill with black warp and brown weft. Could not be preserved.

The piece was very narrow (35 cm.) and the inserted centre gore which was divided by a false seam came up unusually high. It was, comparatively, the longest gore occurring.

At the top there were some trifling remains of the sleeves and lower down a larger piece of the left side with two false seams; undoubtedly there has been a third one, too.

No. 54.

Fragments of a dress of thin and frail material from an interment quite close to dress No. 58 found west of the church at a depth of abt. 56 cm. below the old surface together with cross No. 159. They were penetrated by an unusual number of roots. Above it lay a brown dress that could not be taken up collectedly.

The most interesting object from this interment was a round cap described below under No. 84. There were also remnants of a dress with a round neck and at least two gores at each side. Of the lower portion there was not so much preserved that it could be ascertained whether there had been centre gores in the front- and back-pieces. It was all in such a bad condition that preservation had to be given up. Only a small piece which cannot originally have been connected herewith is preserved, viz. the upper front portion of a little child's frock (cp. fig. 58, IV); it is chiefly remarkable by its peculiarly slanting shoulder-seams.

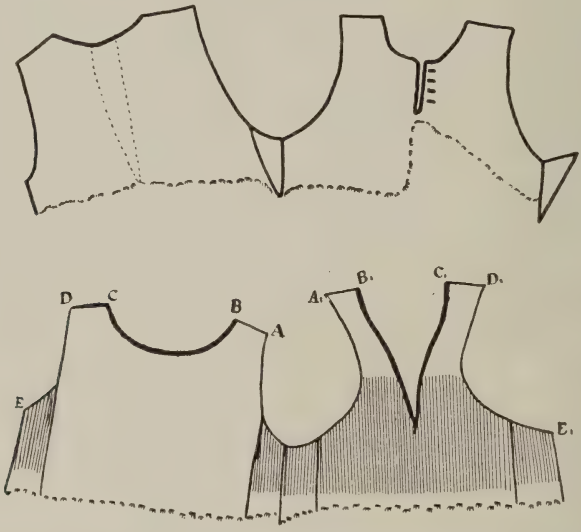

Fig. 74. Diagrams of Nos. 60 and 58 (the preserved upper portions). ($^{1}/_{15}$)

No. 55.*

Remains of a dress found west of the church in a layer above the runic cross No. 123 at a depth of abt. 55 cm. below the old surface. They were, as it were, sown to the earth by countless plant roots. The state of preservation was so bad that they had to be thrown away after the examination which did not yield much information. The material was brown fourshaft twill with a darker warp and a paler weft. The seams had been carefully felled. A small portion of a back-piece with side pieces attached and a sleeve gore were made out, but otherwise the cut cannot be described.

No. 56.*

Remains of a dress found in a layer above coffin No. 11 in the south-east corner of the churchyard at a depth of abt. 72 cm. below the old surface, in so bad a state that preservation was impossible.

There was a back-piece with two centre gores of normal length, also two side gores at each side, those on the left being really one gore divided by a false centre seam, finally the remnant of a sleeve with a very big gore at the back.

No. 57.†

Remains of one or more dresses exhumed in 1900 by district physician G. Meldorf of Julianehaab, and subsequently acquired by the National Museum. The material is thin fourshaft twill of about the same sort as Nos. 38 and 41. Black warp, brown weft.

Preserved: remains of two full-length sleeves of the usual type, at least 55 cm. long. Also a great number of the lower gores of a dress trimmed at the bottom with a cord and subsequently turned under. Remnants of shoulderpieces for front- and back-pieces.

Some of the gores are joined but they do not constitute an entire skirt.

Further there are some fragments of a garment of heavier brown material. Nothing can be made of these fragments.

Finally hood No. 75 belongs to this find.

I d. Slip-over Dresses having a Pleated Bodice.

No. 58.

Remnants of a longsleeved dress (fig. 75) found west of the church immediately north of and slightly overlapping dress No. 42, at a depth of abt. 60 cm. below the old surface. Numerous plant roots had penetrated it. The skeletal remains were almost entirely dissolved, it could be ascertained, however, that the arms, in contrast to the ordinary custom, had been put into the sleeves.

The material is thin and rather open fourshaft twill, with a black warp and dark-brown weft.

It seems to be cut in the usual way of slip-over dresses (fig. 74, bottom), but the details are difficult to explain as only the upper portion of the dress is preserved. A number of seams at the lower part seem to answer well to those of the other dresses. This piece is very remarkable and important in estimating the date of the find, and it is a regrettable circumstance that it is so badly preserved.

The front of the bodice is pleated in close vertical pleats 5 mm. wide over a piece 26 cm. deep. The pleats are fluted and sown down singly with front stitches as may be seen plainly on the wrong side.

The neck is cut into a deep V in front. The length of the sleeve, which is 49 cm., indicates a very small person. The width at the top of the sleeve, which is 55 cm., is large compared with this length though small in itself; besides the usual gore there is another gore here, inserted in a slash (fig. 59, IX). The armhole is cut deep into the front-piece whilst the back-piece, as usual, is almost quite straight. The sleeves are narrow with a slit at the wrists.

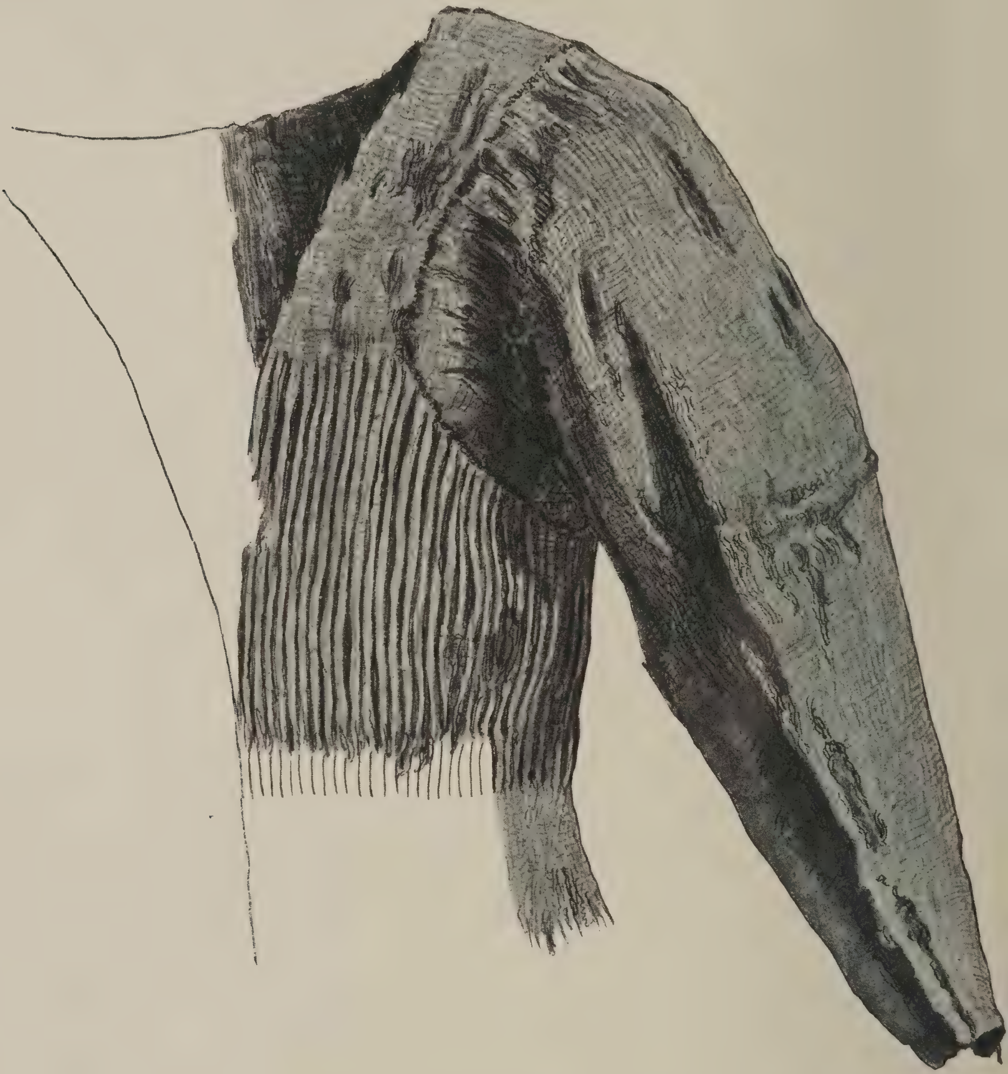

Fig. 75. Left half of the female dress No. 58 with pleated bodice.

No. 59.†

Remains of a dress (fig. 76). Fragments of two gored breadths joined together in a length-wise seam. Greatest length 47 cm., width 28 cm.

This piece is interesting by its upper portion which is sown down in close pleats in a depth of 12 cm. in a manner similar to that in the dress described above. Its upper slightly rounded edge is entire and turned down but not sown. Thus it does not seem to have been any free edge nor would its shape be suitable for the neck or armhole. It is probable that the piece belonged to a skirt which was joined to a small bodice or a yoke, and that the pleats have been continued some way up the bodice.

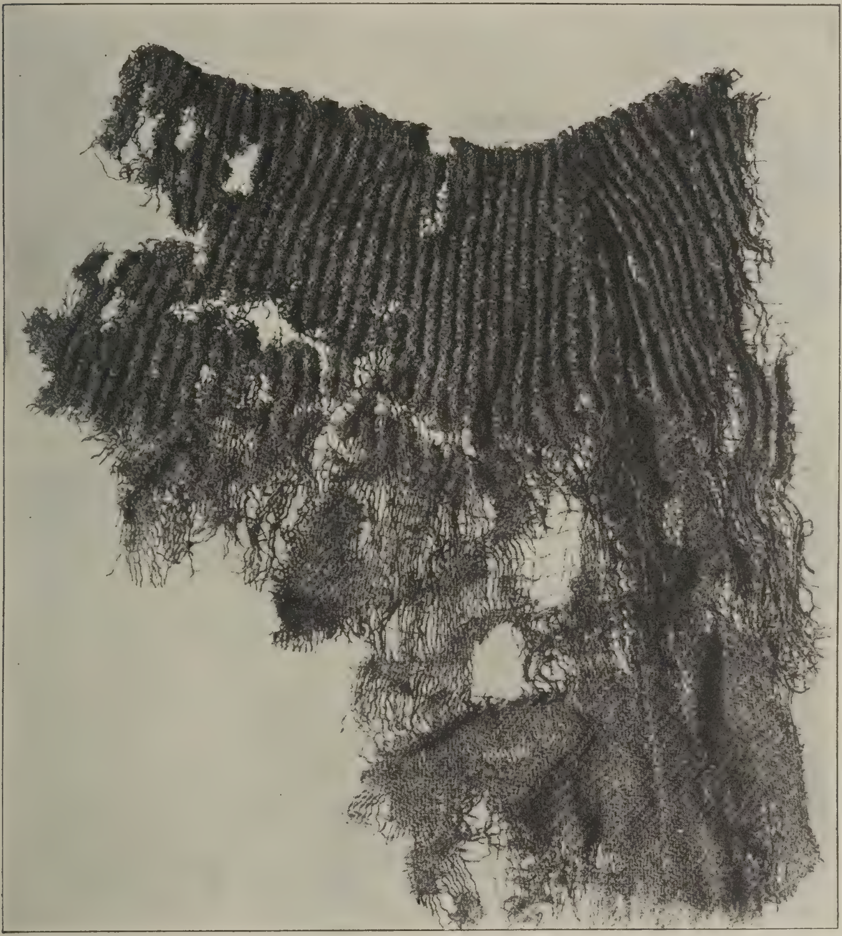

Fig. 76. Remains of a dress (No. 59) with pleated upper portion.

The piece was sent to the National Museum in 1906 by district physician H. Deichmann in Greenland with the information that it had been found in a grave at Ikigait (Herjolfsnes).

I e. Slip-over Dresses having no Side Gores.

No. 60.

Fragments of a gown found west of the church (abt. 45 cm. below the old surface) on top of No. 43 which again covered No. 49 with cross No. 151. It was employed as a shroud for a child of at least ten years of age (teeth were found within it, Anatomical Section XXII).

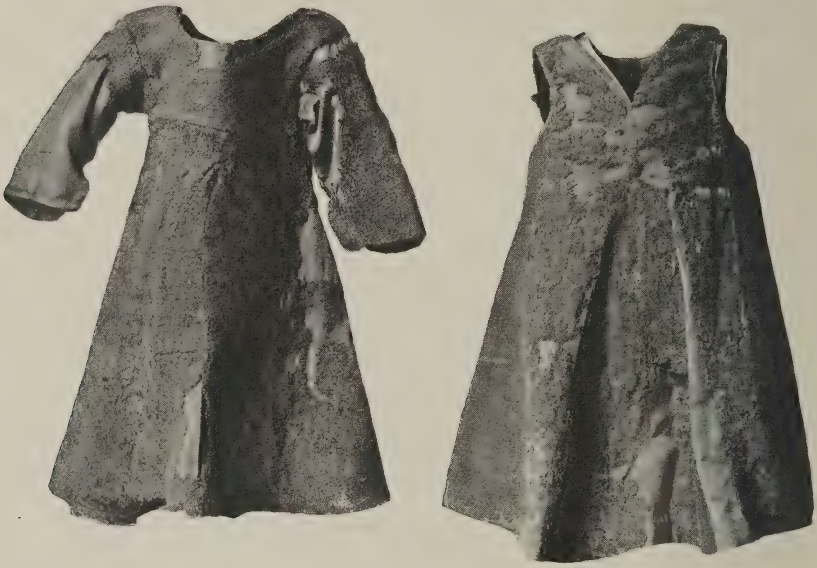

Fig. 77. Children's frocks Nos. 62 and 61.

These are only the melancholy remains of a gown that must have been worn by an adult (the shoulder width of the front-piece is, if anything, more than the normal). It deviates in a very characteristic way from the usual type. It has been torn up to serve its purpose, but only a few of the upper and lower portions have been utilised for the shroud. Fortunately most of the bodice is preserved though the sleeves are wanting.

The material is fourshaft weaving of medium quality with black warp and dark-brown weft.

The various components of the dress are (cp. fig. 74, top): front piece and back-piece which have been slashed from the bottom and probably had only one centre gore inserted as the preserved gore has bias seams on both sides, whilst the centre seam is generally on the straight if there are two gores. There have not, however, been any side gores. The two main pieces put together form the big armhole (66 cm. wide), only a small gore has been let in between them under the arm, with the pointed end downward. Of the sleeves themselves only a remnant of one of the usual gores at the back has been preserved.

As there are no side gores, the two main pieces are much broader than usual (cp. fig. 58, VII). Measured under the arms each of them is fully 50 cm. wide (the normal measure is barely 40 cm.), and these measures are retained towards the lower edge where the slashed skirts are each abt. 23—24 cm. (normally abt. 15—18 cm.). The total width at the waist including the gores is abt. 1.10—1.15 m. Assuming only one centre gore, the total width at the lower edge will be 1.66 m.

The neck is narrow, abt. 45 cm. But there is a deep slash of abt. 10 cm. down the front which has been made to button with four buttons. Only the buttonholes, which do not seem to have been hemmed, have been preserved. The hems finishing the neck and breast slash are well preserved; also remnants of the lower hem are preserved.

I f. Children's Frocks.

No. 61.

Child's frock from the above-described coffin No. 15 (fig. 77, to right). This is the only garment found in a coffin. On the breast lay a large cross (No. 154 below) of fine workmanship but not very well preserved.

The material is brown fourshaft twilled frieze of a rather fine texture. The frock consists of front- and back-piece each with two centre gores, and two gores at each side. Presumably there have been sleeves, but there are no remains of them. Judging from the badly preserved front-piece the neck is V-shaped. The side-pieces are gored without curves, it is comparatively large at the waist, the little frock cannot have fitted the child closely. At the back it is long and has almost a little train. The shoulder height is 51 cm., size of waist 62 cm., width at bottom 1.57 m., size of armhole 26 cm., of neck 42 cm. At the bottom the frock is edged with a thin cord, sown on with long darning-stitches passing backward and forward.

No. 62.

Child's frock found in the western part of the churchyard (fig. 77, to left).

The material is brown fourshaft twilled frieze. It is of the same cut as the adult dresses having a front- and back-piece with two gores inserted in the centre slash at the bottom, but without side-pieces (fig. 78, top). A peculiar characteristic of the front-piece is that the upper portion is cut separately like a kind of yoke to which the slashed skirt with gores has been joined. No doubt this has been done for economical reasons, since in several other parts of the little frock we find similar piecings.

Fragments of both sleeves have been preserved. They are rather narrow and have no gore behind the shoulder, but a short slit at the wrist.

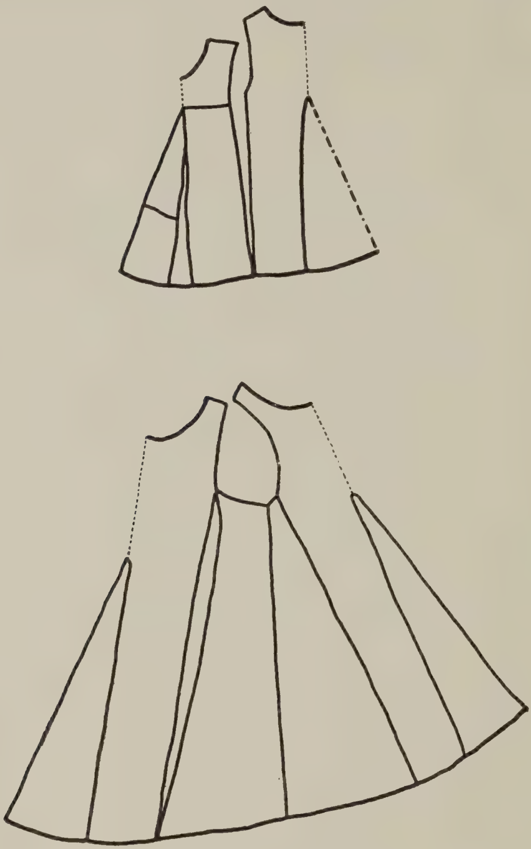

Fig. 78. Diagrams of Nos. 62 and 44. (1/15)

The shoulder height is 49 cm., size of waist 47.5 cm., width at bottom 1.05 m., of neck 42 cm., of armhole 25 cm. The edges of the dress are turned under, but there are no traces of stitching or overcasting, possibly because it has been lined.

The state of preservation is not very good, there are large pieces wanting, still it has been possible to put together the various parts and make up an entire frock. Remnants of an adult dress with sleeves found with this frock could not be preserved.

II. Dresses of High-necked Type having a Front Opening.

No. 63.

Man's dress, highnecked and open in front (figs. 79 and 81). It was found in the north-west corner of the churchyard at a depth of abt. 42 cm. below the old surface, on the top of No. 40 (with the cap No. 83), under which again cross No. 137, completely cut to pieces and in the most literal sense employed as a shroud or wrapping for a corpse. Fig. 24 shows its appearance immediately after uncovering. The sleeves were torn to pieces and wrapped round the feet, and hardly any part of the dress lay in its natural place. Inside the shroud lay a number of skeletal remains but they were quite soft and cartilaginous and could not be subjected to anatomical examination.

The material is a fourshaft twill of medium stoutness with black

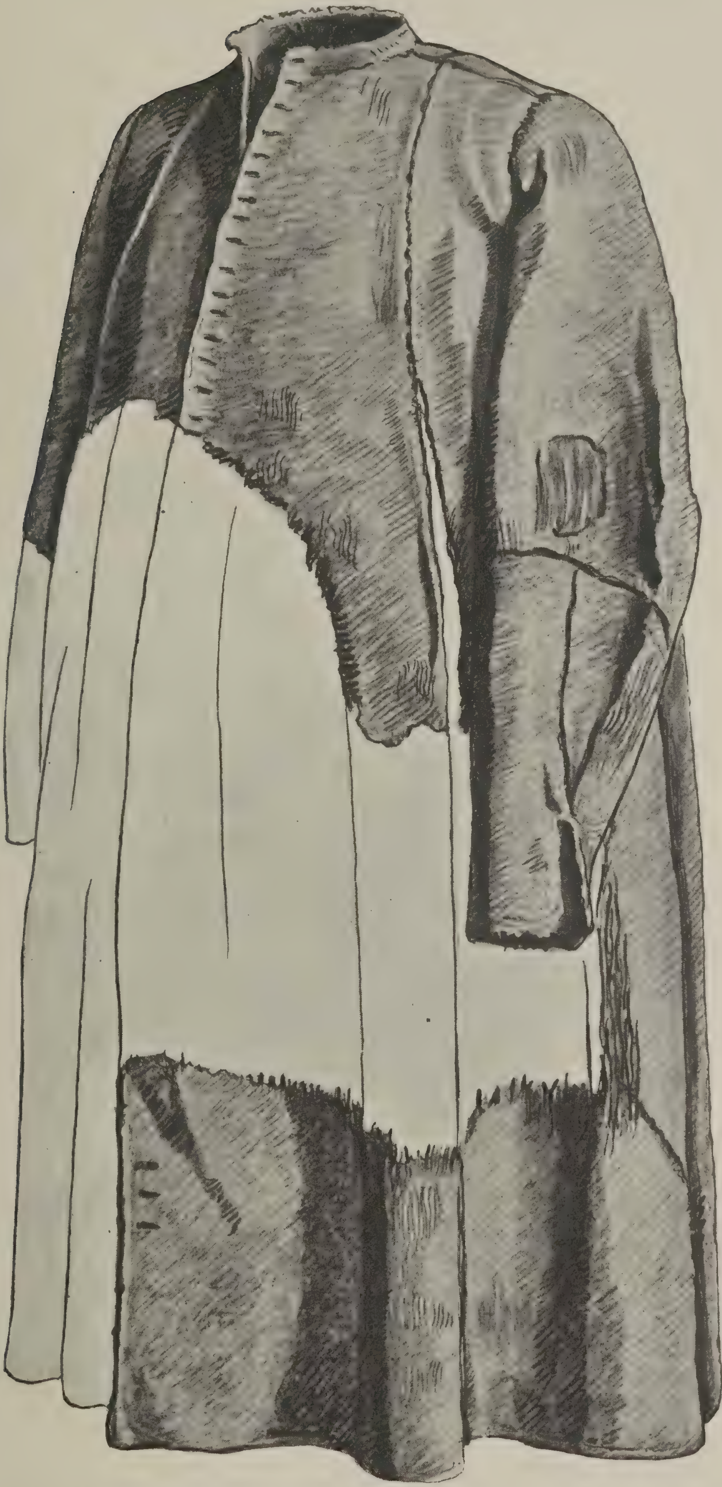

Fig. 79. Highnecked man's dress with front opening. (No. 63).

warp and brown weft. Unfortunately very large portions of the dress are missing. On the right side only the upper fourth part of the pieces is preserved, and of the left front the middle part is missing; only the back is well preserved. The lower half of one of the sleeves is missing and the other one is badly patched.

Nevertheless there can be no uncertainty about the cut of the dress (fig. 80). Apart from the sleeves it consists of 8 gored pieces, all about equally long and wide, four front-pieces and four back-pieces. The four left-hand pieces are all cut with the left side on the straight, the four right-hand pieces the reverse. The four side pieces form the rather large armholes, the four middle pieces form the neck (44 cm.) to which a low stand-up collar is attached (abt. 2.7 cm. high) of the same material as the rest of the dress. The size of the waist is abt. 1.40 m., the width at the lower hem abt. 3.00 m.

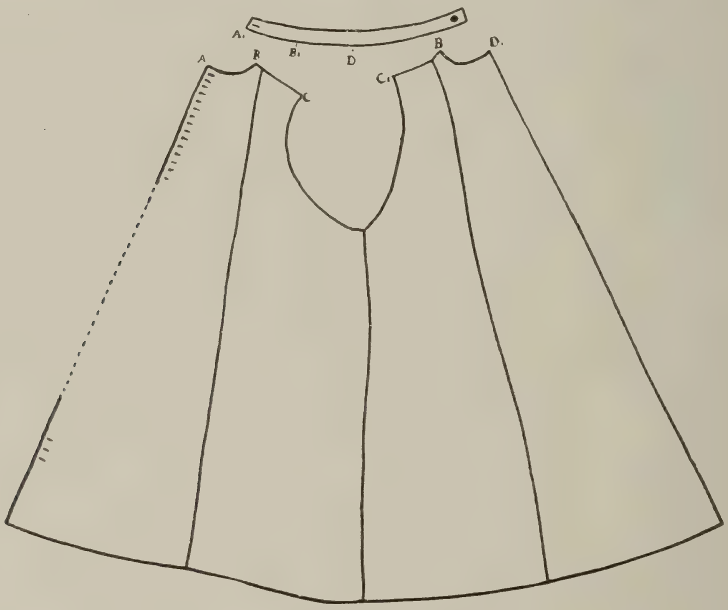

Fig. 80. Diagram of the male dress No. 63. ($^1/_{15}$)
Left half. The collar is given in its total length.

The dress is open in front and has been made to button with buttons placed close together, now only parts of the buttonholes are left. The top one is in the collar, after that come 15 buttonholes in the preserved part of the front edge with a distance of abt. 1.8 cm. between them. The buttonholes may possibly have been continued further down, but a comparison with No. 64 would seem to show that there have been no buttons at the waist, a belt having served instead. But, as in No. 64, there are three buttonholes in the preserved lower piece, 14—18 cm.

from the lower edge, that have served to keep together the skirt of the coat. The hems at the neck and the front-pieces are edged with a thin, paler brown, woollen material. The lower edge is cut off straight and along it lie two cords, each twisted of two threads, and cast on. Another piece has a single cord run on in the ordinary way.

There are the usual one-piece sleeves with a gore let in behind the shoulder (fig. 59, VIII). The fairly complete left sleeve is, however, pieced with a slightly lighter shade of material from somewhere below the curiously baggy elbow. At the wrist there is a slit abt. 10 cm. long. When this slit was sown up, the sleeve fitted tightly round the wrist.

The sleeve length is 62 cm. which indicates a fairly tall person with a shoulderheight of 1.40—1.50 m. As the shoulderheight of the coat is not more than 95 cm., it can only have reached to the knees of the wearer.

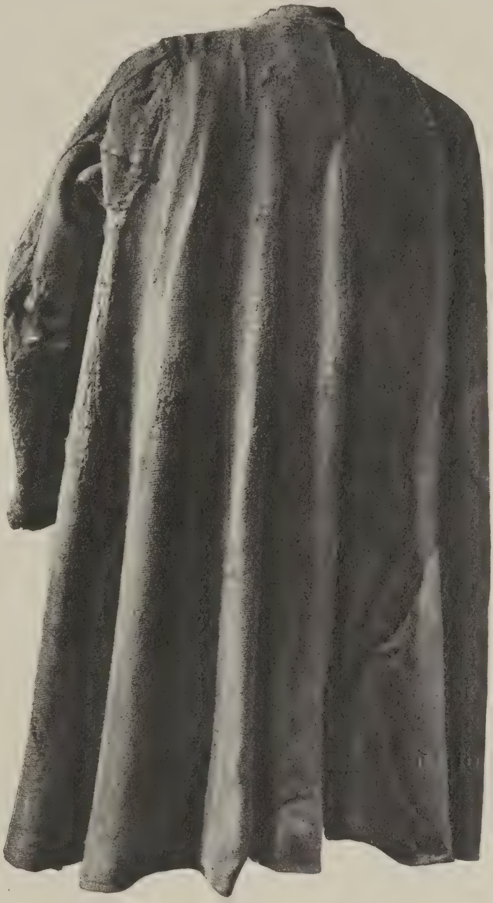

Fig. 81. Back view of No. 63.

No. 64.

Shroud found in the north-west corner of the churchyard abt. 66 cm. below the old surface on the top of hood No. 67, and crosses Nos. 145 and 141. It was much penetrated by root fibres. On the breast lay a simple wooden cross (No. 160 below). Upon examination the shroud proved to be a dress of the later, highnecked type with front opening. Unfortunately it was cut to pieces and rather defective.

The material is thin, brownish fourshaft weaving, and patched with large ugly patches, especially in front. The cut corresponds closely to that of No. 63, there are two front-pieces, two back-pieces and two side pieces at each side forming the armholes. All the pieces are or have been gored and, as in No. 63, the four left pieces are cut on the straight on the left side, and the four right pieces on the right side.

In this a fixed rule must have been followed. It cannot be determined with certainty whether there has been the same little stand-up collar as in No. 63, at any rate it has not been preserved. Of the sleeves scarcely anything is left.

In front the coat has, in all, twelve buttonholes at the top, distributed over a length of 27 cm., and at the bottom two buttonholes with the same distance between as the top ones. The lower one is 24 cm. from the bottom edge. The buttons are missing. From the way the buttonholes are placed at the top and bottom it may safely be assumed that a belt has been worn with the coat.

It is a remarkably long garment. The back-seam has a length of 1.25 m., while in No. 63 it is only 1.03 m. In front the length is 1.07 m., in No. 63 it has most likely only been abt. 95 cm. The coat is a good piece longer behind than in front (18 cm.). If, like No. 63, it only reached to a little below the knees, it should have been worn by a very tall person, a person of abt. 1.80—1.85 m. in height, but it seems most likely, that it has been a rather long and full coat. As the sleeves are not preserved, and there are no marks of wear indicating the exact place of the belt, it is, however, very difficult to come to any definite conclusion on this point.

The size of the neck has been abt. 48 cm., of the waist abt. 136 cm., and the width at the lower edge abt. 3 m. These measures are rendered somewhat uncertain by the incomplete state of preservation. Best preserved are the two centre back-gores, which are almost complete. The side gores, on the other hand, and among these especially the two back ones, are very fragmentary, the material being torn and most of the lower portions missing.

Body-Clothing. — Historical Part.

We may take it for granted that all the costumes found at Herjolfsnes or at any rate the great majority were made in Greenland. Articles of clothing may of course on rare occasions have been imported into the country, as later on we shall see. But the general demand was no doubt satisfied by the women on the farms — the valuable tonnage could not be spared for this, there were plenty of other commodities that had to be fetched from Europe.

Of all the various means of subsistence of the medieval Greenlanders the breeding of sheep was no doubt the most important. Of the wool of these sheep frieze was made in such quantities that probably it could even be exported as from Iceland. Among the smaller objects found in the course of years during the excavations on old Norse sites the greater part are spinning and weaving implements, and it is no exaggeration to say that, wherever we put our spade in the ground on such a site, we may be sure of finding at any rate a loom-weight before half an hour's digging. At the present moment they are preserved by hundreds in the National Museum in Copenhagen. At Herjolfsnes, too, were found several such spinning and weaving implements though here there was very little occasion to dig on the dwelling-sites. The most interesting specimen is a little weaver's "sword" of wood (No. 189, p. 224 below).

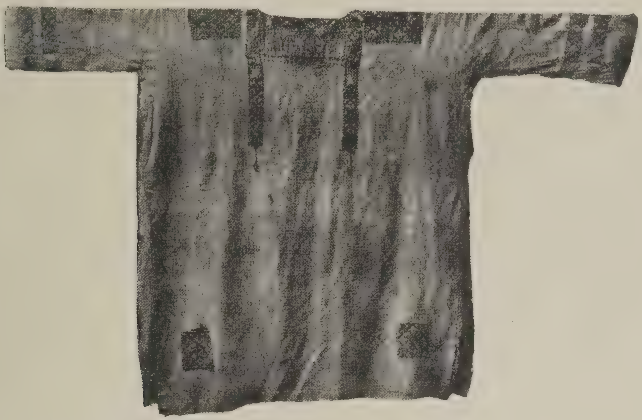
Fig. 82. Linen tunic from Egypt. 7th cent. a. C.
O. v. Falke: Kunstgeschichte der Seidenweberei I.

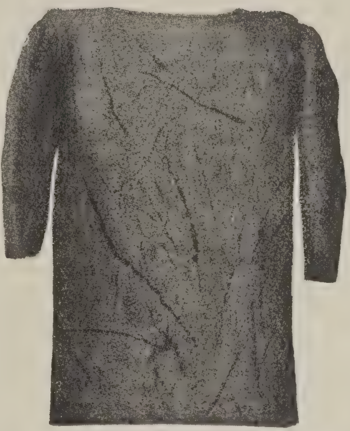
Fig. 83. Tunic from Thorsbjerg Bog in Slesvig 4th cent. a. C.
Kiel, Archæological Museum.

In spite of these circumstances we cannot in any of the costumes from Herjolfsnes detect a single special Greenlandish feature. There is no real adaptation to the arctic climate, no influence from Eskimo culture, not even that simple concession to mountainous ground which a shortening of the costume would be, and this may be said both of the male and the female costume. In cut and style, the dresses are entirely European, for each little peculiarity a similar trait may be shown in European delineations of apparel from the same period.

For the varying fashions, the leading centre north of the Alps was then, as now, Paris, and in the later Middle Ages in addition the Court of Burgundy and the rich Netherlands. That the Scandinavian peoples, too, took their cue from them is seen with all desirable plainness from the numerous French names for clothing that gained a standing in the Northern languages in as crude and unadapted a form as any modern technical term. We have, for instance, syrcot (*surcot*), wardekors or gardekors (*garde-corps*), kotardi (*cothardie*), hjupr (*jupe*), kaprun (*chaperon*) and several others.

From Norway or Iceland the fashions spread to Greenland. The Greenlanders, too, kept abreast of the times. They observed the traders from abroad and tried to imitate their dress to the best of their ability, or they received patterns that might serve them as models from friends in Europe. Thus, in 1308, the bishop of Bergen sent to the bishop of Gardar in Greenland "a cloak, a surcot, and a chaperon of paleblue lined with black fur, and in addition a gown of the same cloth"[1].

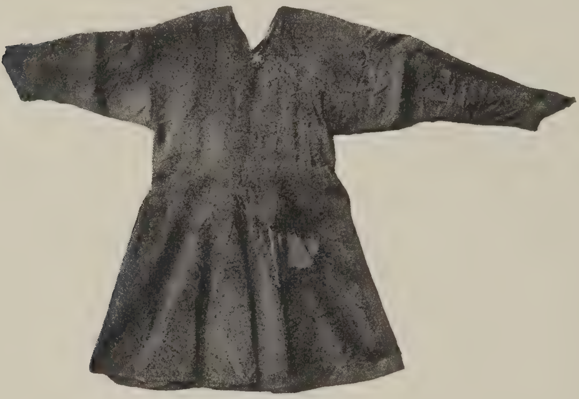

Fig. 84. Gown from Kragelund Bog, Jutland. (probably 12th—13th cent.). Copenhagen, National Museum.

Hence, the costumes from Herjolfsnes must be dealt with as a chapter in the general history of European costume which is greatly in need of such a contribution of original dresses. Worth mention there are hardly any others from the same time for comparison, except Queen Margaret's golden dress from abt. 1400, now in Upsala Cathedral[2]), and the gown from Kragelund Bog in Jutland, referred to below. In the following pages we shall attempt to trace the various fashions to the land of their origin, but of course they must not for that reason be dated according to their first occurrence in France or some other leading province of culture. The fashions spread first to Scandinavia, and it was no doubt by this way that they reached Greenland. It will always remain a somewhat arbitrary estimate how much time we assume to have been employed in this migration, we must, however, remember that for a fashion to get from a Parisian courtier to a Greenland farmer and hunter, it must not only travel over the numerous miles, but also sink in the social scale, and this latter process, especially, must then have taken no little time.

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[1] The letter accompanying them has been printed in GHM. III. p. 96 f. Dipl. Norv. X. 15.

[2] Agnes Branting: Das goldene Gewand der Königin Margareta in der Domkirche zu Uppsala (Stockholm, 1911).

There are, in particular, three important points to determine in regard to the Greenland costumes, viz. their age, their "sex", and their use (as upper or under garments). These three points cannot be dealt with separately; in order to arrive at a result we must continually pass from one point to another.

The principle of the slip-over dress, the type prevalent in the find, with its cut in separate front- and back-pieces joined together by shoulder seams, may be traced back to the gown found in Thorsbjerg Bog in Slesvig (now in the Archæological Museum at Kiel) which must be assumed to date from the 4th century a. C.[1]). It is questionable whether the type is much older. At any rate it shows marked divergence from the more primitive cuts of the Bronze Age dresses found in Denmark and of the dresses of the late Roman Empire found in Egypt. The male dress of the Bronze Age is formed of a single rectangular piece of material, wound round the body and kept up by shoulder straps[2]), and this type, developed into a real gown, appears again in the bogfinds of North Germany dating from the earlier Migrations[3]). The Egyptian dresses (fig. 82) are likewise formed of a single piece

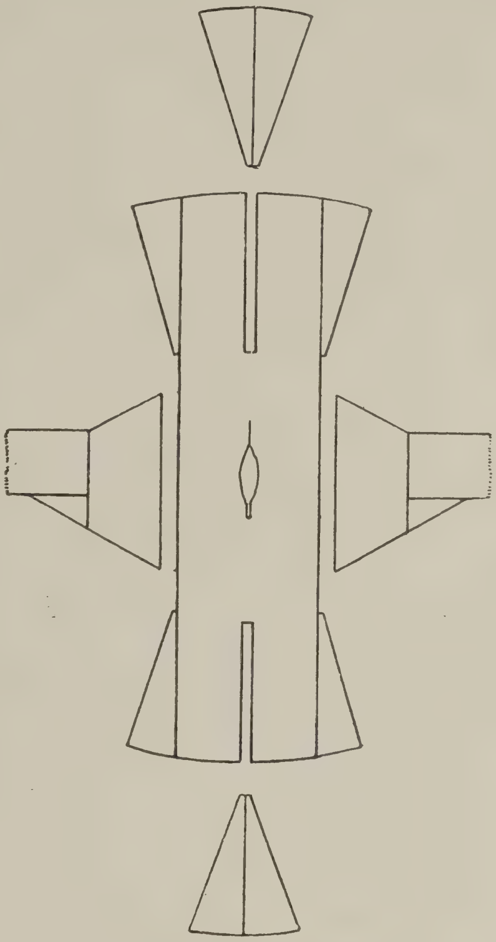

Fig. 85. Diagram of the Kragelund gown. ($^1/_{30}$). Front and back-piece in one, with centre and side gores added. The sleeves are placed opposite the neck-opening.

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[1]) Engelhardt: Thorsbjerg Mosefund (1863).

[2]) Boye, Fund af Egekister fra Bronzealderen i Danmark (1896). Soph. Müller in AfnO. 1891, p. 108.

[3]) Find from Marx-Etzel and Obenaltendorf in Hanover, see Hahne, Jahrb. d. Provinzial-Mus. zu Hannover 1909—10, II p. 10, pl. I and VI. Vorzeitfunde

of material, this, however, is laid over the head for which a hole is cut. The free ends hang down in front and behind while the long sides are joined together in seams on either side of the body[1]). This cut was in use far down into the Middle Ages long after the time of the Thorsbjerg tunic. A find from Kragelund Bog by Viborg (Jutland), now in the National Museum at Copenhagen, includes a gown, the front and back of which is formed of a single piece having a slash cut for the head. Besides, it has, however, gores inserted at the bottom, at either side under the arms, as well as in the middle of the front and back (figs. 84—85), and this denotes a later feature. With the gown the material of which is threeshaft frieze, was found a pair of shoes which unfortunately do not exist any longer but were of the pointed type from the 12th—13th century or perhaps even later.

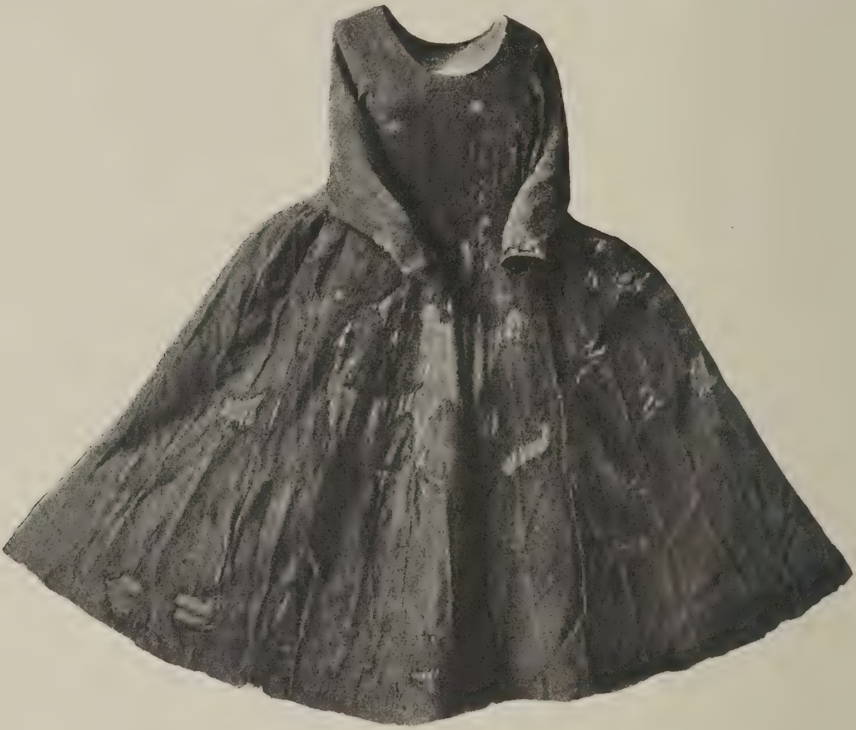

Fig. 86. Dress No. 38 spread out to show figure and width.

As regards the Greenland dresses we are in the fortunate case of being able to determine their date within rough limits by the aid of

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aus Niedersachsen Bd. VI p. 14 pl. I and VI; p. 32, pl. XVI and XX. Mannus, Ergänzungsband II p. 23 seq. (1911).

[1]) The short female jacket of the bronze age was of a similar cut. See publications quoted p. 135 note 2.

historical facts. The Icelandic settlers came to Greenland shortly before the year 1000, and they lost connection with Europe in the course of the 15th century. We do not indeed know exactly when, and as we shall see the finds at Herjolfsnes have increased our uncertainty, but all circumstances seem to indicate that it happened before the close of the century (see Chapter XI). From the point of view of European history and archæology, we shall then be restricted to the Middle Ages of the northern countries, and in this connection it is of minor importance how long the remote colony was able to exist after it had been definitely cut off from all communication with the kinsmen in Iceland and Norway.

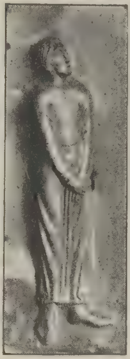
Fig. 87. Long full male gown from the beginning of the 13th cent.
From a copper-gilt altar-antependium in the National Museum, Copenhagen.

When seeking to fix more exact dates we at once encounter the question of the difference between the male and female dress. Throughout the Middle Ages women wore a long full gown, while the male dress continually varied in length. In the early Middle Ages it does not reach below the knees, but about the middle of the 12th century, by influence from the East, it suffers a striking increase in length. Then follows a period of almost 200 years in which the male and female dresses resemble each other so much that it is often difficult to distinguish one from the other¹) though the female dress was, as a rule, a trifle longer. If it descended to the feet, the male dress reached to the ankles or to the middle of the calf.

This womanish fashion reached Norway at the close of the 12th century when King Sverre scoffed at his warriors, the famous "*Birkebeiner*", for their long "*dragkyrtla*", i. e. trailing gowns — formerly the Birkebeiner wore shorter and scantier gowns, he said, but they had more courage in their hearts²).

It was not until the middle of the 14th century that the upper classes went to the opposite extreme, and the young men, as it seems under the influence of a change in the armour of knights³), began to wear close jackets barely reaching below the hip and showing the legs in their entire length. It will easily be understood that after men had for centuries been accustomed to the long gowns, this bold exposure

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¹) J. Quicherat: Histoire du costume en France p. 192. Il y eut tant de ressemblance entre le costume des hommes et celui des femmes au treizième siècle, que des antiquaires, même experimentés, ont plus d'une fois confondu les sexes sur les monuments.

²) Fornmannasögur VIII. 336.

³) P. Post: Die französisch-niederländische Männertracht im Zeitalter der Spätgothik 1350—1475, p. 26. (Diss. Halle, 1910).

of the limbs gave the greatest offence. Moralists declaimed loudly against it, nor did the long male dress disappear at once.

The short, narrow dress does not occur at all among the dresses from Greenland which with a single exception all date from that period of fashion when men wore long gowns. It is thus no easy matter to distinguish between the male and female dresses of the find. This, in fact, presents far greater difficulties than the determination of the date, and in some cases it has not been possible to arrive at a conclusive result.

Our first resource in this difficulty is the anatomical determination of the skeletal remains found in the costumes, which has been carried out in so masterly a manner by Professor F. C. C. Hansen. Unfortunately the skeletal remains were only in a few cases sufficiently well preserved to render possible a determination of the sex, but some valuable points of support have been gained.

But how can we be sure that the dead were buried in their own clothes? We have already mentioned that the corpses were not, properly speaking, dressed. The dresses have been used for shrouds which were merely wrapped round the dead. Thus only in a few cases were the sleeves drawn on. What then is to prevent our assuming that any discarded dress found in the wardrobe of the farm was taken at random to swathe the body?

This objection is entirely warranted. At the outset great scepticism would, indeed, be in place, but luckily it will gradually give way to greater confidence. It is true that a hood (No. 66) has been used to wrap round the feet, and we cannot conclude anything from incomplete or sundered dresses (thus No. 60, part of an adult dress, has been used to swathe a child). But if we confine ourselves to the complete dresses, we find a series of points on which there is complete correspondence between the anatomical and the archæological examination, in spite of the fact that they were quite independent of each other. The calculated sizes, in particular, show satisfactory agreement. We agree that Nos. 38 and 39 are small and slight, No. 37 medium-sized, and Nos. 41 and 45 tall and powerful. And when the anatomical examination showed that the skeletal remains found in No. 39 were those of a lame woman with a crooked spine, this is in excellent agreement with the fact that the dress itself is unequal in length and drops at one side. Only in the case of No. 40 do we find embarrassing divergencies, the skeleton being that of a woman, while the cap found with the shroud must be supposed to be a man's, and also the dress itself seems to be of a male character. Among the hoods we also find one case of divergency (No. 79).

So many cases in point render it probable that the dead person was, as a rule, actually buried in his or her own clothes, and the anatomical determinations entitle us to assume that Nos. 35 and 37 are male costumes, Nos. 36, 38, 39 and several others female costumes. Of these costumes unfortunately only the latter two have been preserved in complete state, both distinctly feminine in their whole appearance, and, taking these and especially No. 38 as our starting point we shall now attempt to arrive at further determinations on the basis of their proportional measurements. A more general estimate will be of small value in this case for the very reason that the difference in the dress of the two sexes was so little marked. We cannot say that the low-cut dresses were female dresses, they were worn just as much by men whose undergarment was only higher in the neck and who also wore hoods with shoulder-capes. Nor can the short sleeves or the close body be taken as special characteristics of the female dress. Not even the pocket-slits can be taken as a distinguishing mark of one or the other of the sexes.

Our only criterion is the relative length of the dress. A long full dress reaching to the feet is a woman's, a gown reaching only halfway down the calf is a man's. By a comparison of the full-length sleeve with the length of the dress we shall try to form an estimate on this point. In six cases we have been able to make such a comparison, the sleeve being apparently in all cases a close-fitting sleeve reaching to the wrist.

There exists a certain though highly variable proportion between the length of a man's arm and his full height. I have made a great number of measurements in order to determine the ratio between the distance from the edge of the shoulder to the wrist (the length of the sleeve) and the distance to the sole of the foot. I have found the two extremes 1 : 2.65 and 1: 2.25. The most frequent ratio is 1 : 2.50, but to guard against the error of assuming the dresses to be shorter than they actually were — and herein lies our chief danger — we reckon with the ratio 1 : 2.30. We may then tabulate the six dresses as follows:—

No.	Length of Sleeve	Shoulderheight of Dress	Calculated Shoulderheight of Person	Difference
33	57 cm	108 cm	131 cm	23 cm
38	53 ,,	119 ,,	122 ,,	3 ,,
41	62,5 ,,	120 ,,	144 ,,	24 ,,
42	56,5 ,,	115 ,,	130 ,,	15 ,,
43	58 ,,	108 ,,	133 ,,	25 ,,
63	62 ,,	95 ,,	143 ,,	48 ,,

From the figures in the last column it may be directly seen that No. 38 which had been anatomically determined as female, is actually a dress reaching to the feet, while No. 63, of type II, has only reached to the knees and is beyond doubt a male costume. Nos. 33, 41 and 43 have only reached midway down the calf and are beyond doubt male dresses, while No. 42 is less pronounced but most probably male. Most valuable is the determination as male of No. 41, a low-cut gown with many sleeve-buttons.

We may continue with similar calculations as to the position of the pocket-slits, since we must assume that they have been placed at a certain definite height, on a level with the hips. The nearer they are to the lower edge of the dress the shorter it must have been. The distance from the lower edge of the pocket-slits to the lower edge of the dress is generally a little above or a little below half the shoulder height though it varies from 0.58 in No. 38 to 0.47 in Nos. 42 and 37. This proves again that No. 38 has been very long, while our assumption that No. 42 is a male dress is corroborated. No. 37, too, was shown by the anatomical determination to be most probably male. Nos. 45 and 47 give the figure 0.52, and there is great probability that these, too, are male. No. 45 is at any rate of such ample dimensions that it can scarcely be imagined to be female.

Finally we may attempt to draw conclusions from the proportional length of the centre gores, though only in the case of very close-waisted dresses where it may be assumed that they were inserted immediately below the waist line where the whole dress suddenly gets fuller. It is thus probable that the longer the centre gores are, compared with the entire length, the farther down will the dress have reached. In the five close-bodied dresses of group I b the relative length of the gores is in

38	0.70
39	0.69
40	0.57
41	0.58
42	0.72

This fully confirms our belief that Nos. 38 and 39 which anatomically have been determined as female, really are long and full dresses, while No. 41 is short[1]). No. 40 is the questionable dress belonging to a female skeleton but assumed to be male from the cap found with it. This assumption seems to be corroborated by the figure above. On the other hand our figure for No. 42 contradicts our former assumption that this was a male dress, so we are unfortunately left in doubt as to the sex of this interesting and stately garment.

We are, however, able to point out some dresses that are certainly male, not only 33, 37, and 43, but especially 41 and probably 45; among these dresses four belong to the largest of all, a fact which tends to corroborate our determination. In the history of costume it is of no little interest to establish the fact, that not only was the male and female dress of similar appearance, as shown in numerous pictures of the period, but there was also no difference whatever in their cut.

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[1]) The front-pieces in No. 38 are 125 cm. long, in No. 41, 128 cm., while the gores are 89 cm. and 73 cm. respectively, a very obvious difference.

If now we go a step further and attempt to assign a date to the costumes it will be well to begin with one of the most characteristic and most easily recognisable types.

Such a dress is the one which we placed in group Ib where it is represented by 5 specimens. It follows the lines of the body to the hips and then descends in soft, ample folds to the lower edge. It may, even when it is a man's dress, be cut rather low in the neck[1]), and sometimes it has "pocket-openings" at the sides. These latter are an important distinguishing mark from which we may conclude that the dress is an upper garment and that is has been worn without a belt. It is most probably the garment called cothardie by the French (*tunica audax*)[2]). This type begins to appear in France at the close of the 13th century. In the period immediately before the surcot is worn. It is of the same length but not close-waisted, and is most frequently worn with a belt[3]). The latter is, however, little by little transferred to the undergown, but as it was necessary to have easy access to it, amongst other things because the purse or the sword was often suspended from it[4]), small pocket-like side-slits were introduced at the end of the 13th[5]) or the beginning of the 14th century, the French *fichet*, Latin *cluniculum*, through which the hand could be inserted to get to the belt and purse or from which the hilt of the sword could project (fig. 90). For the less warlike a step further was subsequently taken when a small bag was placed at the slit as a substitute for the purse, the so-called "*fausse bourse*" or false purse, this being the origin of our pockets. But such actual pockets do not occur in the costumes from Herjolfsnes.

The pocket-slits were especially a feature of the long close-waisted cothardie and are found in it throughout the whole of the 14th century. Another feature of the same fashion was a short sleeve with a long

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[1]) Cp. Chronic. Anonym. Leobiensis, ad a. 1336 (Pezii Script. rer. Austric. I col. 948) Ampliabant etiam tunc (i. e. after the death of king Albrecht I in 1308) capicia, id est foramina per quæ caput vestem egreditur, ut in hominibus istis humeri, scapulæ, pectora in maxima parte apparerent.

[2]) Enlart, Le Costume, table alphabétique p. 556 "La cotardie avait un buste ajusté et une ample jupe, elle se portait sans ceinture".

[3]) When hanging loose, it is generally furnished with long slashes at the sides or very wide armholes without sleeves.

[4]) In Floamanna Saga we find the following passage: Torgils struck the bondman so that his purse, which had been hidden by his upper-garment, fell to the ground (GHM. II. p. 165).

[5]) Enlart, Le Costume, p. 55 seq. Examples before 1300 have not come within my experience.

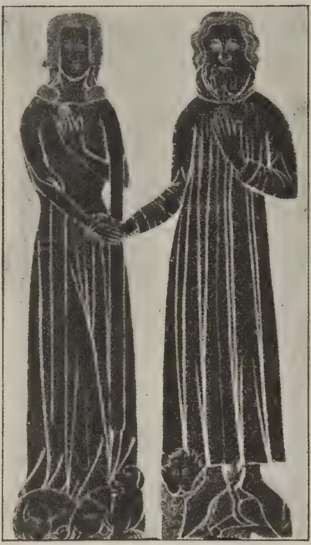

Fig. 88. Brass with the figures of R. Torryngton and wife (1356).
Victoria & Albert Museum: Catalogue of the Collection of Rubbings of Brasses.

pendent streamer¹) (fig. 88) and a shoulder-cape, and from the middle of the century a long-tailed hood. The long streamers from the sleeves are not found in the Greenland costumes²), though in all other points they faithfully follow this fashion.

In the Collect. Gaignières, vol. II (Bibl. Nat. in Paris) we find a series of pictures representing male effigies from sepulchral monuments from the close of the 13th century, showing the earliest examples of dresses of this type, though always without pocket-slits at the sides³). The oldest dresses having pocket-slits in this tombstone series are worn by Pierre le Maire de Fresnoy who died abt. 1340, and his wife whose effigy is on the same stone⁴). In England, at the same period, we find a similar fashion, common to both sexes, represented on the monument of John of Eltham (died 1337) in Westminster Abbey. On his sarcophagus we see a row of small crowned "weepers" fashionably clothed. They wear dresses of this cut, low in the neck, having pocket-slits and no belt⁵), and from the succeeding period we have numerous examples of this type of dress for both sexes⁶), but sometimes the pocket-slits

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¹) Chronic. Anonym. Leobiensis ad a. 1336 (p. 141 note 1). In superioribus tunicis etiam acurtabant manicas, ut super brachia vix ad cubitum attingebant, sub cubito vero longum quid ut vexillum dependebat.

²) The female costume, No. 39, may, however, probably have had them. Its short sleeves have no proper hem, as if they were incomplete, and one of them has even a small incision in which a streamer could have been inserted.

³) Fol. 31 Jean de Repenty († 1285), fol. 34 Jean Colons († 1272), fol. 39 Thibaut Planteoignon († abt. 1284) and best fol. 56 Jean Larchier, seigneur de Coudray († 1296). For the next period see ibid. vol. III fol. 56 (abt. 1340), 57 (abt. 1340), 58 (1329), 59 (1333), and 60 (1337).

⁴) Coll. Gaign. vol. III, fol. 67.

⁵) On the sarcophagus of Aymer de Valence (executed 1326) a somewhat earlier type is still prevalent. The women have pocket-slits, the men never. On the sarcophagus of Thomas of Savoye (died 1332) in the cathedral of Amiens one of the weepers has a pocket-slit through which he puts his hand, but the dress is not close-bodied.

⁶) A. Schulz: Deutsches Leben I p. 366, II figs. 291 and 293. Cod. Balduini Trevir., before 1350 (Irmer: Die Romfahrt Kaiser Heinrichs VII, pl. 20 and 36). H. Y. Thompson, Illustrations of one hundred Mss. in the Library of H. Y. Th. pl. XVIII (Heures de Jeanne II de Navarre, abt. 1342, fol. 106v). Quicherat, p. 192. Couderc, Album des Portraits XXXIX (1352). — Vict. & Alb. Mus., Collection

are placed rather more to the front in a way unknown in the Greenland dresses[1]).

These examples are, however, principally taken from the upper classes, the nobles, their attendants, and the rich burghers, and it is not until the second half of the 14th century that the middle class adopts the same dress at a time when the young fops had already made the transition to the short dress. In Collect. Gaignières vol. IV (fol. 55 et seq.) we find pictures of the social orders copied from a ms. of 1372,

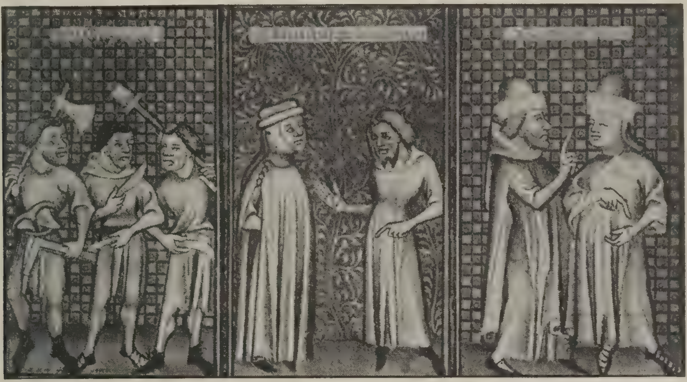

Fig. 89. A picture from Ms. 11201—2 in the Bibl. Royale at Brussels (abt. 1375). The Politics of Aristotle translated by Nic. Oresme.

A representation of "*mauvaise politic*", with groups of conspirators of the different social orders, inscribed "*povres*" "*moiens*", and "*riches*".

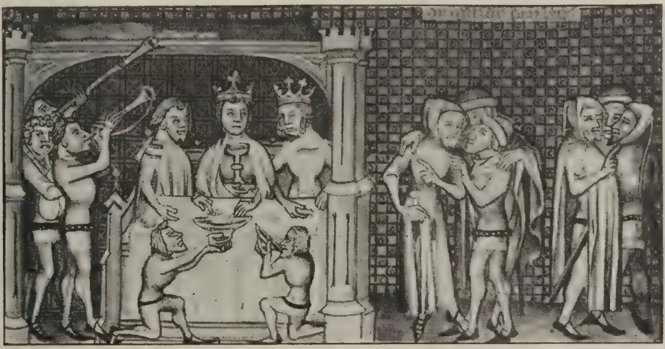

Fig. 90. Another picture from the same Ms. (fol. 181).

"*Conspiration occulte*" outside the royal castle.

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of Rubbings of Brasses (Department of Engraving, Illustration, and Design) contains several typical examples, see the catalogue, pl. 16, N. Aumberdene (abt. 1350), R. Torrynton and wife (1356), R. Braunche and two wives (1364).

[1]) See e. g. Enlart figs. 47 and 61. Also Bibl. Nat., Ms. fr. 22545 (abt. 1375) passim, esp. 71v and 72.

showing only the "seigneur" wearing the short tight-fitting dress whereas the other classes have retained the oldfashioned long and full gown with the exception only of those who, like the falconer, the juggler, and the artisan, wear an ordinary gown to the knees, as it will be found without variation throughout the Middle Ages.

In the Bibl. Royale in Brussels (Ms. 11201—2) we find some other pictures of the social classes from the same years, in Nicole Oresme's translation of the Politics of Aristotle. Particularly characteristic is a tripartite picture entitled "*mauvaise politic*" (fig. 89) representing groups of conspirators inscribed "*povres*", "*moi*(*ens*)", and "*riches*". Each order is there characterised by its own dress, and the close-bodied long and full gown is peculiar to the middle class[1]). The upper classes have already abandoned them as oldfashioned and adopted the new fashions with the very ample upper garments which were beginning to be worn at the close of the century over the short tight-fitting dress, while the poor wear a half-length, loose, convenient gown bearing the mark of no special period.

When trying to form an estimate of the period of the Greenland costumes of this cut we must be guided by the latest mentioned datings, and we may presumably take it for granted that they do not belong to an earlier period than the middle or the latter half of the 14th century[2]). For more advanced in dress than the French middle classes the Greenland farmers can hardly have been. One of the most prominent characteristics of these dresses is their numerous gores, a single dress having no less than twelve. We saw that this was no doubt a refinement of fashion which could be imitated by means of false seams. The Icelanders had a special name, "fjolgeirungr", for this type of dress, and it is no doubt to this fashion an Icelandic bishop alluded when in 1345 he ordered all the clergy to discard their "fjolgeirunga" within a month[3]). This must at that time have been the latest fashion. As usual, the authorities resisted the new fashions, but when their novelty wore off, they ceased to give offence and were universally adopted. The word itself does not denote gores of different colours, but of course it is quite possible that it may very often have been so as in other European countries.

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[1]) As regards the women they kept to these lines in dress much longer than the men, see Quicherat, Histoire du Costume en France p. 258 (abt. 1390). — Vict. & Alb. Mus. List of Rubbings of Brasses pl. 44, 2 (1419).

[2]) In Denmark we find the same dress on a tombstone with the effigy of Henning Moltke in Kjeldby church on Møen (fig. 91). It is, however, difficult to say exactly what period it represents. The knight died in 1326, but the tombstone was hardly executed until fifty years later. (Løffler, Danske Gravstene fra Middelalderen p. 25 seq. and pl. XX).

[3]) Dipl. Isl. II 791. Falk, Kleiderkunde p. 81 seq.

One feature of the male dress No. 41, the numerous closely placed buttons of the under sleeve, deserves special mention. We find them very often in representations from the 14th century in connection with this type of dress, mostly in the female dress, but also in men's costumes[1]). They always belong to the gown itself, however, not to the surcot which then, as a rule, has short sleeves with or without streamers. The Greenland costume has certainly no pocket-slits, and might thus possibly be an ordinary gown in spite of its great fulness at the lower edge.

Group I c comprises a number of rather different dresses several of which are so incomplete that they do not call for more detailed discussion.

A common feature is, that in cut they correspond to group I b, having both centre gores and side gores, but the latter have not swayed contours, and thus the dress is not close-waisted. That this type need not necessarily be older than the very close-waisted dresses will appear from the fact that No. 47 was found above the small woman's dress No. 38, and No. 45 above one of the hoods from the later period (No. 79).

Presumably this group comprises both upper- and under-gowns. No. 45, which according to the circumstances of the find cannot be of an earlier date than 1400, no doubt belongs to the former sort. On account of its ample dimensions but proportional shortness we have determined it as a male dress. Its great width and especially its pocketslits show it to be an upper gown. It is very closely related to the before-mentioned cothardies of group I b but it bears the stamp of being the dress of the humbler class of men, not only because it is not close-fitting but also on account of the very coarse material of which it is made. It is a dress of this description which in fig. 92 is worn by the peasant seen at the top carrying a spade.

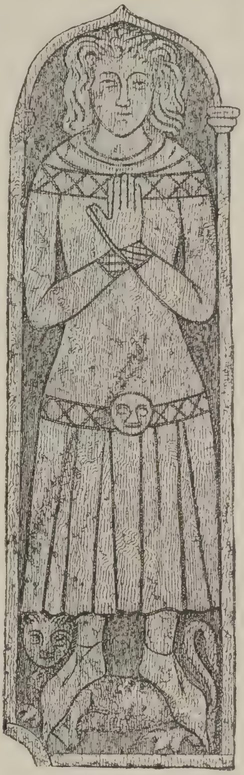

Fig. 91. Effigy from the tombstone of the knight Henning Moltke, in Kjeldby church on Møen (14th cent.).
Løffler: Danske Gravstene fra Middelalderen.

No. 43, on the other hand, with its deep front slit, must be regarded as an undergown. It is narrow both at the waist and at the lower edge and bears plain marks of a belt. Such a garment is of a rather undeterminable age. The lack of either buttons or eyelet-holes at its front slit[1]) would seem to be an early feature, but, on the other hand, the circumstances of the find indicate rather a late date as will be explained in more detail in Chapter X, the dress being found in fairly good preservation not far below the surface. It cannot, however, belong to the very latest interments, being found under two more recent burials.

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[1]) See e. g. Vict. & Alb. Mus. List of Rubbings of Brasses pl. 34 (1364). Collect. Gaignières II fol. 60 (Guillaume Malgeneste, d. 1301).

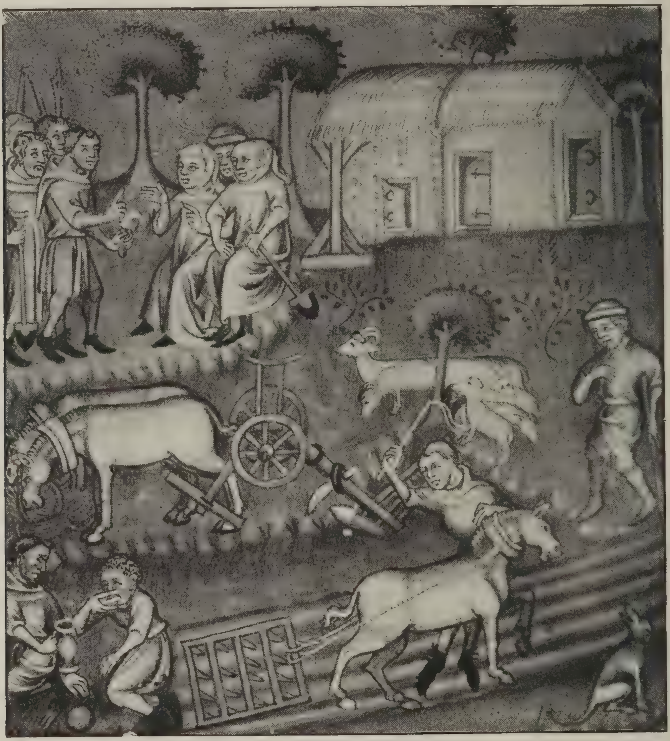

Fig. 92. A representation of "*bonne démocracie*" from Ms. 11201—2 at Brussels (fol. 241). Abt. 1375.

In one of these two superimposed interments were found the sundered remnants of another, even more characteristic, undergown, No. 60. It is peculiar among the adult dresses by lacking side gores, hence its width at the lower edge has not been great. It is narrow in the neck and has a breast-slit similar to that of No. 43, but made to button. Because of the circumstances of the find it must be assumed to be one of the latest among the dresses.

It seems a very probable supposition that the gowns of group I a, characterised by the lack of gores in the front- and back-pieces, are of an earlier type than those dealt with above. They are at any rate nearer to the prototype, the gown from Thorsbjerg Bog in Slesvig, which entirely lacks gores. With garments of such a simple type we must, however, always keep in mind that they may be undergowns or the dress of the common man which kept unchanged throughout long periods. In either case we must expect a greater simplicity, less fulness, and less length, at any rate for the men.

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[1]) It was probably closed with a brooch in the same way as shown in fig. 134.

The circumstances show how well justified such a consideration is. As a matter of fact, No. 34, one of the unslashed gowns, was actually found on top of a hood (No. 72) which, as we shall see below, belongs to the later of the garments and cannot be dated farther back than abt. 1400. Likewise, No. 35 was found on the top of hood No. 68. Thus we cannot assign an earlier date to these more simple and primitive gowns than to the close-bodied gowns. The fairly complete man's gown No. 33, which descended below the knees of the wearer and is made of very coarse material, was probably made for one of the servants on Herjolfsnes farm or for some small farmer in the neighbourhood. But it is of too plain and simple a type to enable us to assign a more definite date to it.

Only one of the gowns in this group deserves special mention. It is No. 37, of which only the back-piece has been preserved. Judging by the skeleton it is a man's gown. The skeleton is of a man of abt. 1.53 m.'s height, and as the preserved piece is 1.16 m. long, the gown must have reached midway down the calf[1]). It is thus no short gown like No. 33. At the sides it has had pocket-slits and is thus an upper-garment, but its most peculiar feature is its great width, not only at the lower edge but also at the waist. In this respect it shows marked deviation from the above-mentioned cothardies and is most likely older, at any rate as a type. It calls to mind the surcots of the 13th century, but it is probably of a somewhat later date since pocket-slits cannot be assumed to have reached Greenland until some way into the 14th century.

In the preceding part we have several times alluded to the fact that in the middle of the 14th century the young men began to wear short and quite close-fitting garments. Also the fashionable dress of the preceding period fitted closely to the waist but now the jacket becomes so tight that it has to be cut open in front and buttoned or laced. The slip-over dress is thus given up and the modern type of male dress comes in, in reality a revolution in the history of costume. But this transition was not made without friction. Quite apart from the indelicacy of the short dresses the very fact of their being buttoned gave offence to a certain extent. The synod of Cologne in 1371[1]) prohibited the wearing by clergymen of an upper garment buttoned from the neck to the lower hem, or on the whole with a longer slit than was necessary for the convenient drawing over the head.

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[1]) This length corresponds well with the position of the pocket-slits, see above p. 140.

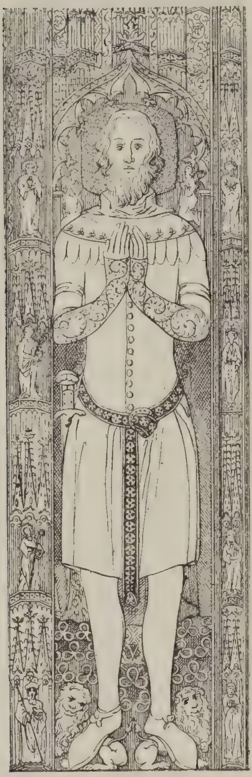
Fig. 93. A Danish burgomaster from Ribe, Andreas Bundesen (d. 1363).
Detail of Brass executed in the Netherlands.

None of these short dresses occurs in the find from Herjolfsnes. It would not be strange if a fashion so badly suited to the cold northern climate had never been adopted in Greenland, but this cannot be proved from the fact that they are lacking in the find, for the short dresses would at any rate be particularly unsuitable for shrouds. And even if we do not meet with the tight-fitting jacket, we feel the effects of the revolution it caused in the world of clothes. In the find we have two dresses open in front, buttoned with closely placed buttons both at the top and bottom. In contradistinction to all the other upper dresses they are high-necked and have a small stand-up collar[2]) (Group II). One of them has reached below the knees and is undoubtedly a male dress, the other, which is not a little longer, might possibly be a woman's. They are wide at the waist, where they have probably been held together by a belt, and necessity does not, as in the tight-fitting jackets, require that they should be open in front. For all practical purposes a breast-slit would have been quite sufficient.

In addition to the quite short jackets we also in the second half of the 14th century meet with buttoned costumes of almost the same length as our male dress No. 63. The earliest known to me is from the tombstone of Simonet Dubois (d. 1354)¹), and no later than nine years after we find it on the tomb of the Danish burgomaster Andreas Bundesen from Ribe (d. 1363). Here, however, we have one of the fine Flemish brasses — now unfortunately perished —, and the elegant dress of the burgomaster on this imported brass (fig. 93) cannot be taken as a standard of dress for Danish burghers in the middle of the 14th century²).

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[1]) See A. Schulz: Deutsches Leben II 301 a. 2 Statuentes poenas in clericos, qui vestem superiorem ante pectus a summo deorsum inferius usque ad oram deferre publice praesumant botonatam vel ultra spatium, quo quis commode caput suum ipsi vesti inferre possit.

[2]) This appears on the scene simultaneously with the close-fitting costume, see for instance Jean de Vaudetar, Couderc: Album, pl. XX.

But this half-long dress, too, was always tight-fitting, and as it seems regularly to have been worn with a hood, it must be assumed that it was not high-necked. It was some time before the practical purpose of the buttons was forgotten, and not until the close of the century was the new principle transferred to the full high-necked dress which then came in.

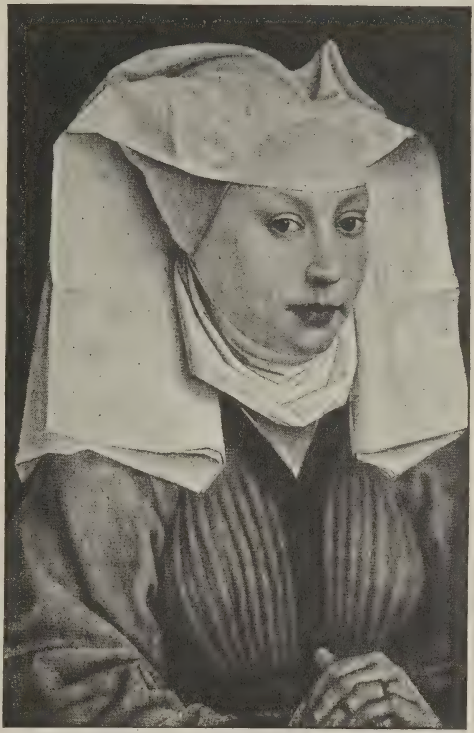
Fig. 94. Rogier v. d. Weyden (d. 1464): Portrait of a young woman.
Berlin, Kaiser Friedrichs Museum.

We have reached the year 1400 before we find evidence³) of this, but on the other hand a dress like No. 63 may occur throughout the 15th century and is frequently represented in the paintings of the early Flemish school. We can hardly get nearer to the dating of our two buttoned dresses than the statement that in so remote a place they cannot be older than the beginning of the 15th century.

The new cut characteristic to our group II is related to that of Queen Margaret's dress from abt. 1400⁴), which we have several times mentioned above. There are certainly very essential differences, but

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¹) Enlart, Le costume fig. 53. From the close of the century is the stone of J. v. Holtzhausen (d. 1393), see A. Schulz: Das häusliche Leben p. 235.

²) On the carved stalls of the cathedral at Roskilde, executed in 1420 we find this dress worn by the humbler people (Løffler: Korstolene i Roskilde Domkirke Pl. 3 and 4). In "Norges gamle Love" III p. 219 (a. 1384) mention is made of "karlmanns kyrtill knappaðan" but no further description is given.

³) Couderc: Album Pl. XLVII (abt. 1400), especially a figure in the middle of the lower row.

⁴) A. Branting, Op. cit. Pl. III.

there are also important similarities. Queen Margaret's dress has a quite short bodice or yoke, cut separately, to which the long gores are sown. It is not open in front, but the most important point is that it has also a seam down the middle of the front and back, thus consisting, not as the earlier dresses of a front- and back-piece, but of two right, and two left side-pieces.

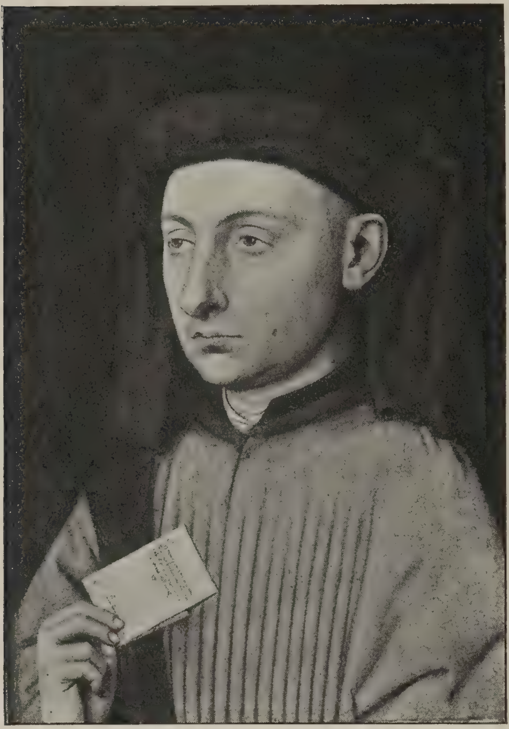

Fig. 95. Petrus Christus (d. 1473): Portrait of Marco Barbarigo.
London, National Gallery.

We must, however, follow the history of medieval costume through one more phase of development. After the tight-fitting dress, first long, later short as far as the men were concerned, had been in favour throughout the 14th century, the loose upper garment began to gain ground again about the year 1400. It was held together at the waist by a girdle, under which the material was often laid in careful and regular folds or pleats which it was the business of the valet or ladies' maid to arrange. This fashion very soon became stereotyped so that the pleats were actually stitched down, the material fitting smoothly above and below the pleated piece. These regular pleats may be observed even in the beginning of the 15th century[1]) but it is difficult to say when they were first stitched down. By the middle of the century this fashion had a great vogue both in Italy, France and the Netherlands[2]) (figs. 94 and 95), the pleats grew narrower and narrower and in Italy they might be seen on other parts of the dress, for instance, the sleeves (fig. 96).

No delineation of such a fashion is known to me from the Scandinavian countries. It is all the more astonishing that it actually reached

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[1]) Les très riches heures du Duc de Berry, ed. P. Durrieu (1904), Pl. I.

[2]) They are seen often in paintings of this period, e. g. by Filippo Lippi, Benozzo Gozzoli etc. Compare further School of Robert Campin, Magdalen reading (London, Nat. Gal.) and Couderc, Album pl. LXXIV, LXXVIII, LXXIX—XC and XCII.

Greenland. There it can hardly be earlier than the second half of the 15th century.

The pleats are very narrow, only abt. 6 mm., and in both the preserved specimens they are only found at the waist. One of these is easy to place, it is a little woman's dress, of the usual cut, but with a V-shaped neck, as was common in the 15th century. The pleated portion is 13 cm. deep and does not extend to the back.

The second specimen presents greater difficulties because so little of it has been preserved. As we attempted to explain above (p. 125) it must be regarded as part of a skirt to which a small bodice or yoke has been attached as in Queen Margaret's dress. The pleated portion is only 12 cm. deep in this case. Presumably it has been continued some way up the bodice.

The pleated dresses represent the latest stage among the clothes for the body found in Greenland, and that a later stage than we should have expected to find. In the following pages we shall, however, see that they are not quite isolated instances.

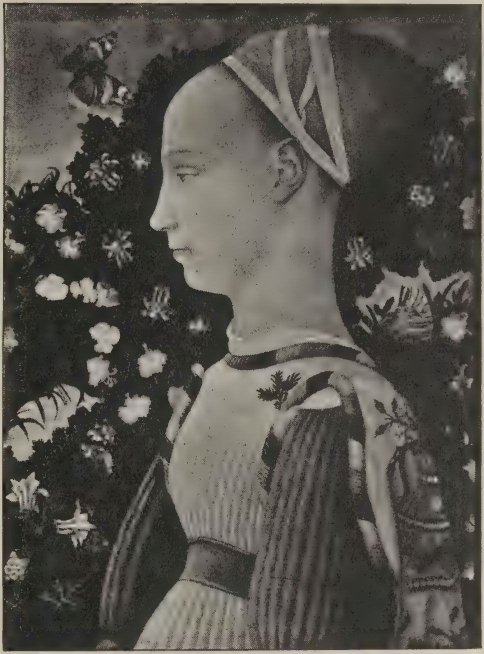

Fig. 96. Pisanello: Princess of Este (abt. 1440). Louvre.

Hoods. — Descriptive Part.

The hood, this characteristic medieval head-dress, as will easily be understood, won great favour in the inclement Greenland climate on account of its practical properties. It has been found at Herjolfsnes in no less than seventeen specimens, one of which is, however, derived from an earlier exhumation. Most of them are fairly well preserved.

The hoods are made to pull down over the head, they usually fit close about the neck and have a shorter or longer cape falling over the shoulders. In front above the forehead they usually project in a small "horn" in consequence of the edge being designed to be turned back from the face. On several of the pieces there are marks of wear showing that they were often worn in this way. Behind, at the back of the head they have a ribbon-like tail or liripipe of varying length and breadth, which, however, has only been preserved in a smaller number though originally a feature of them all. The head-piece itself is large enough to have been worn over a cap as shown in No. 80. But the opening for the neck is often so narrow that it is difficult to understand how it could be pulled over the head. The seam below the chin has, indeed, frequently burst. But it can hardly, one would think, have been so unpractically contrived that this had to happen every time the hood was put on. Involuntarily we are led to assume that the Greenlanders had very small heads, an assumption which is fully corroborated by Professor Hansen's anatomical examination.

Dimensions of the Hoods in cm.

No.	Breadth from the front-edge to the back-seam	Width round the neck	Width along the lower edge of the cape
65	36	58	128
66	30	57	176
67	28	57	154
68	26		
70	28	56	135
71	29	52	120
72	27	46	128
73	26	40	108
74	25	41	112
75	28	45	
76	28	47	114
77	28	43	96
78	32	52	94
79	28	45	84
80	24	42	70
81	28		

The hoods are always formed of two uniform halves with seams along the crown, down the back of the head and under the chin. According to their cut they may be divided into two main groups though transition forms are not lacking. Type I is distinguished by a large cape, a fairly large-sized neck, and a single gore in front under the chin. The necessary width for the cape is obtained partly by this gore and partly by a bias back-line. In some of the specimens part of the tail is cut in one with the hood itself so that only its lower end is added.

Type II has a shorter cape, a small-sized neck¹), and no breast-gore. Instead it has a gore inserted in a slash at each shoulder. The tail is always cut separately and sown on to the hood at the back. It

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¹) In type I the neck is abt. 57 cm., in type II usually abt. 43—47 cm

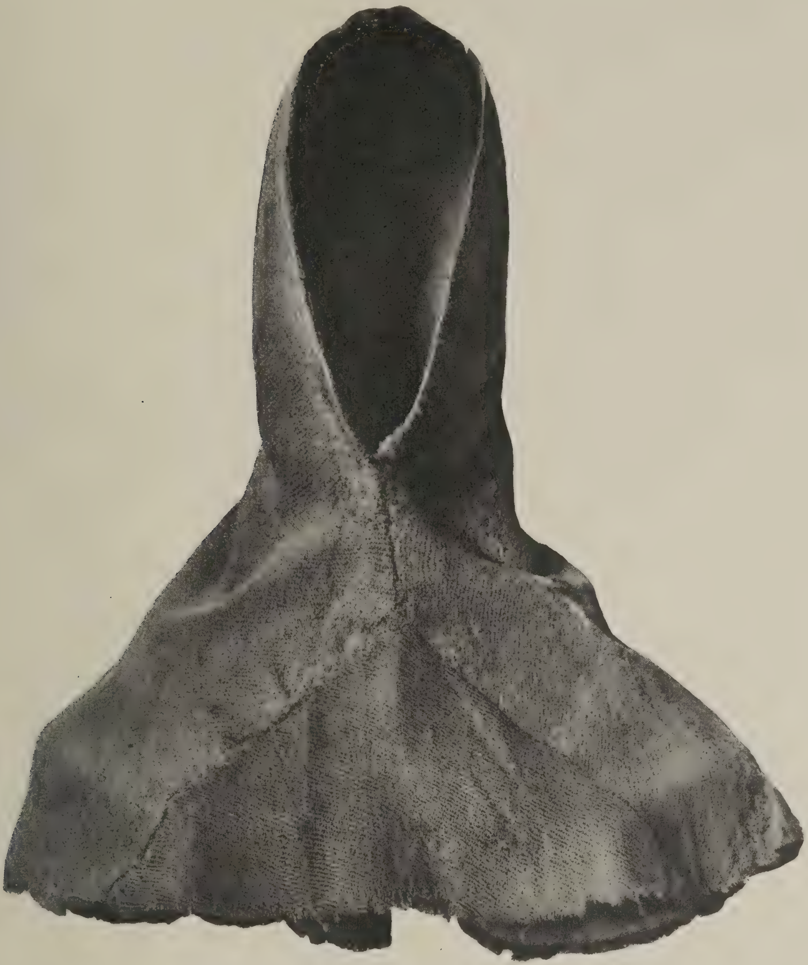

Fig. 97. Hood No. 66. Front-view.

is made of a double layer of material, either of one piece laid double with a seam on the under side, or of two strips with seams both on the upper and under sides (to imitate the appearance of type I).

Type I.

No. 65.

A much damaged hood, taken up in the north-east corner of the churchyard at a depth of abt. 70 cm. below the old surface (figs. 98 and 112). It is of coarse fourshaft twill with a brown weft and an almost black warp. In cut this hood is of type I (fig. 101, I) lacking shoulder gores and having only a quite small rudimentary gore in the middle of the front and back of the medium-sized cape. On the other hand the tail, which has not been preserved in its entire length, is not cut in one with the hood, but fastened to its oblique crown. It is very short on the shoulders but hangs rather far down the back.

The most striking feature about this specimen is its very large and clumsy proportions. While the hoods are otherwise not generally more than 28 cm. from the neck to the front edge, this one is 36 cm. and the size at the neck is also the largest occurring in any hood. The exceptionally broad tail (11 cm., at the root 12 cm.) contributes further to this impression.

We inevitably draw the conclusion that the man who wore this hood must have had a remarkably large head. But the anatomical examination of the skeletal remains (see below, Anatomical Section No. X) entirely upsets this view, since, on the contrary, they indicate a very small and slight though adult person, about 25 years old. Hence it must either be a very oldfashioned type, as hoods did not assume more elegant lines until in the course of the 14th century (see below p. 169 seq), or it must be supposed that the hood was worn by a woman whose hair necessitated the larger dimensions. As far as we know from European representations, women's hoods were usually made to button under the chin, but the same result would be obtained by making them sufficiently wide in the neck.

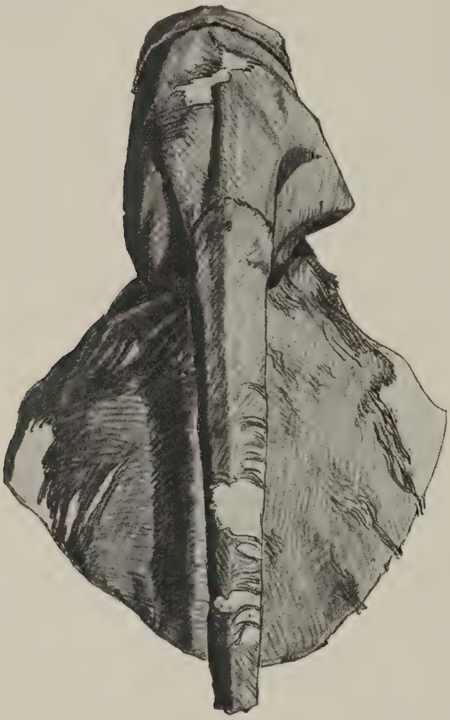
Fig. 98. Hood No. 65. Back view.

No. 66.

Hood taken up in the western part of the churchyard at a depth of abt. 75 cm. below the old surface (figs. 97 and 99). It was noted that it lay with the crown turned toward the east, thus giving rise to the assumption that, in this exceptional case, the body had been inhumed in the reverse of the customary position. On further examination, however, it was found that there were bones of the lower limbs inside the hood. (Anatom. Sect. IX) This, then, was the surprising explanation of the unusual and un-Christian position, that the hood was wrapped round the legs of the body which was, however, quite decomposed though the outlines of the skeleton could be discerned in a length of abt. 1.73 m. west of the head-end of the hood. The large cape was carefully folded and the tail wound once round the legs of the body (fig. 41).

The material is brown fourshaft twill, the warp somewhat darker than the weft. The cut is of type I (fig. 101, III) with a large cape without shoulder-gores and with part of the tail cut in one with the hood and the rest added. A broad breast-gore is inserted in the cape. As will be seen in the diagram this gore may very well be explained as a simple piecing, for the front edge of the cape itself is a direct continuation in a straight line of the front edge of the hood. This is a case, however, in which, calling to mind medieval illuminations, we are very much tempted to believe that the gore had a colour differing from the hood itself.

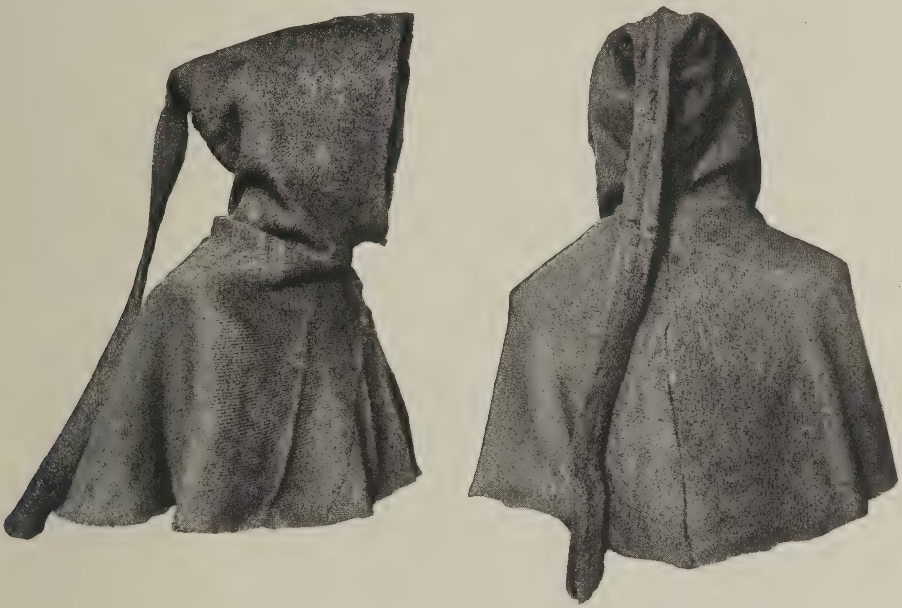

Fig. 99. Hood No. 66. Side and back view.

The tail is of the same length as the cape, viz. 60 cm., the width is 4 cm. at the top, decreasing slightly towards the point. From the back of the head to the front edge the hood is 30 cm., the width round the neck is 57 cm., at the lower edge of the cape 1.76 m.

The state of preservation is fairly good especially as regards the right half which apart from a little damage of the weft at the temple is absolutely unimpaired. The material is not as good as that of other specimens, it shows some tendency to crumble. There are no old patches. What hems there may have been have quite come off.

No. 67.

Hood found in the north-west corner of the churchyard underneath gown No. 64, but above the crosses Nos. 145 and 141. The body to which the hood belonged lay untouched but without other grave clothes. The skeletal remains were quite soft. They have been determined as belonging to a young individual of 16—20 years (Anatomical Section No. XXI).

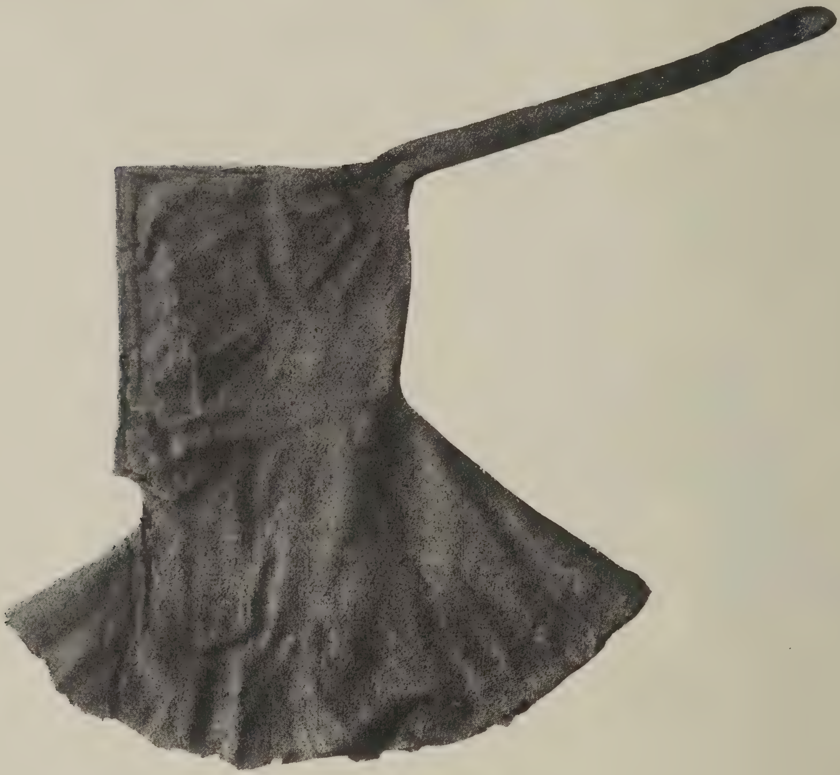

Fig. 100. Hood No. 67 extended to exhibit the cut.

The material is good heavy fourshaft twilled frieze of a pure brown colour. The weft is worked in so closely that the warp is hardly seen (there are 8 warp-threads, but 11 weft-threads per square cm.).

The cut is of type I (fig. 101, II) with a single gore in front and most of the tail cut in one with the two halves of the hood. Only at the very end there is a piece added. The front edge round the opening for the face is almost entirely gone on both sides and the right half has other great defects besides, while the left side apart from the front edge is in excellent condition. The hem is worn off. The width from the front edge to the back of the head is 28 cm., round the neck 57 cm., and along the lower edge it measures 1.54 m. Fig. 100 shows the hood extended to exhibit the cut.

No. 68.

Remains of a hood taken up south-east of the church at a depth of abt. 1 m. below the old surface. The body to which it belonged lay untouched but almost decomposed in a length of 1.44 m. or 1.60 m. including the point of the hood which pointed backward. There was no sign of any shroud beyond the hood. In the layer below it lay a number of disturbed bones and among them the hose No. 93 and the crosses Nos. 119 and 134. In the layer above lay remnants of a gown without centre gores (No. 35), also the child's hood No. 74.

The material is plain-woven and of brown colour but part of the warp-threads are black. There are no shoulder gores, but there has presumably been a front gore. The cape is of medium length, its back-line very slanting whilst the lower outline is almost quite horizontal (cp. No. 65). It cannot have reached over the shoulders. The tail has been, at any rate partly, cut in one with the hood. The width of the hood from the back of the head to the front edge is 26—27 cm. Hems, simply overcast, are preserved in a few places.

The state of preservation is very bad, one half is almost entirely gone, the other has great defects.

No. 69.*

Remains of a hood of fourshaft brownish material found in the western part of the churchyard together with one half of a cross (No. 164). The cut belongs to type I with front gore. It cannot be determined whether it had any tail as the whole of the back portion was missing. Its state of preservation was so hopeless throughout that it had to be thrown away after the measuring and examination.

No. 70.

Hood exhumed west of the church at a depth of only abt. 50 cm. below the old surface (fig. 103 to right). Inside were found teeth of an individual of 14-15 years (Anatomical Section No. XVI). The body could be made out undisturbed but quite decomposed. There was no trace of further clothing.

The hood is of darkbrown fourshaft frieze with a darker warp and a paler weft. Contrary to the usual custom the hood is cut so that none of the edges are on the straight and as no hems are preserved, the front and bottom edges, being on the bias, show a tendency to fray.

The cut is according to type I (fig. 101, IV) with a front gore and no shoulder gores, the cape is medium-sized. The tail is cut separately and sown on at the back of the head. It is 84 cm. long and as thin as a whip-cord (14 mm.), made of one strip of material with a seam on the under side. It is the longest and smartest of them all and has reached down below the back.

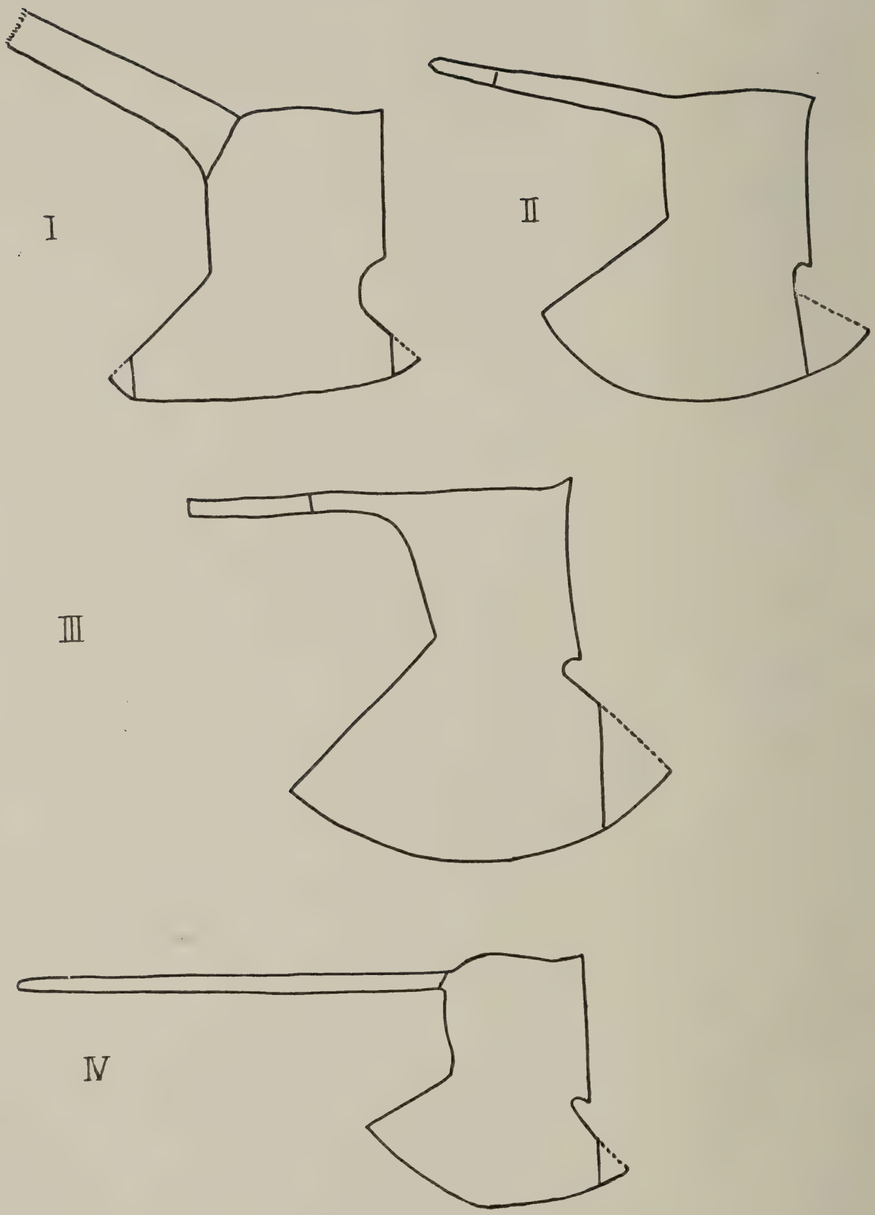

Fig. 101. Diagrams of hoods of type 1. ($^{1}/_{15}$).
I No. 65, II No. 67, III No. 66, IV No. 70.

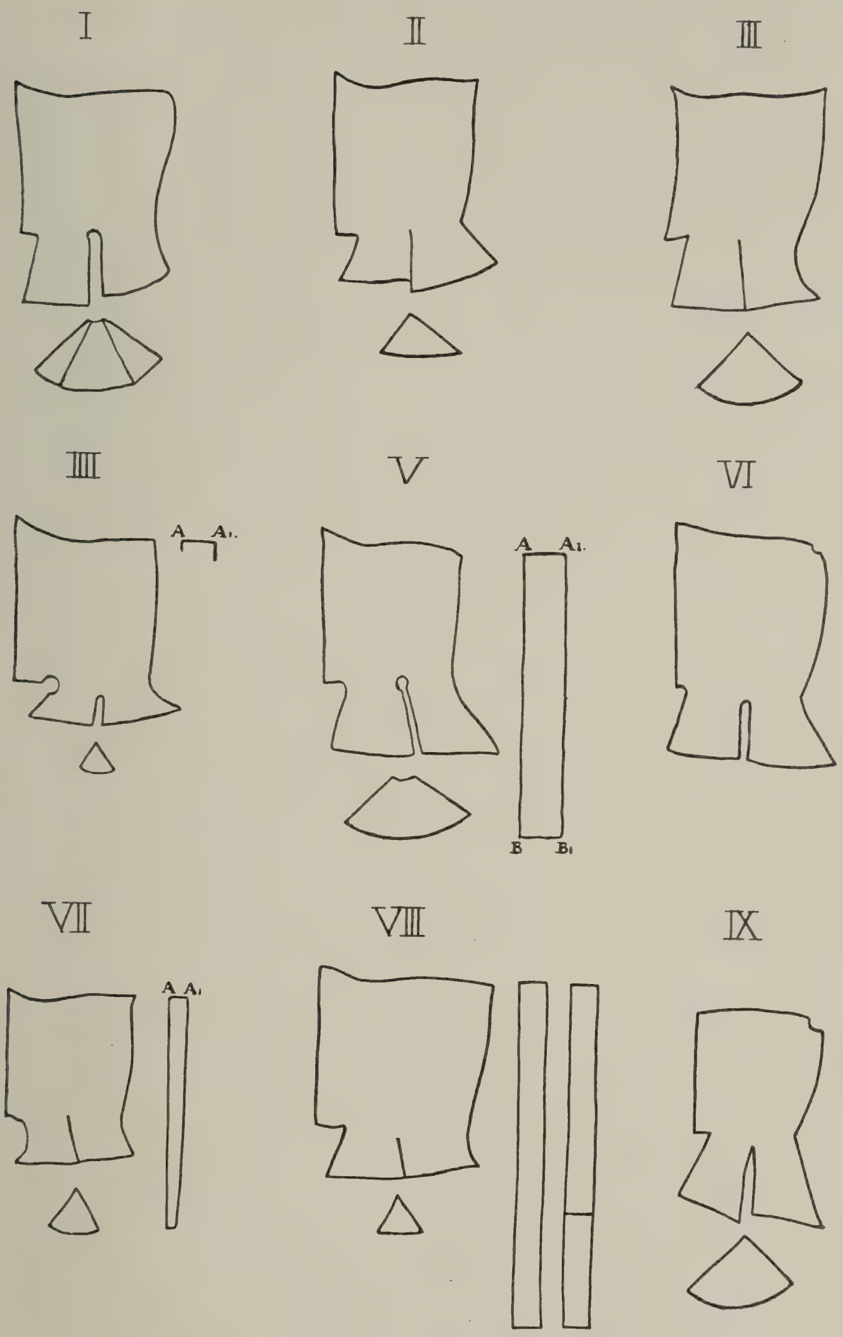

Fig. 102. Diagrams of hoods of type II. ($^1/_{15}$).
I No. 71, II No. 77, III No. 76, IIII No. 79, V No. 72, VI No. 75, VII No. 80, VIII No. 78, IX No. 73.

Type II.

No. 71.

Hood taken up in the north-west corner of the churchyard at a depth of 55 cm. below the old surface (fig. 104, IV; comp. fig. 25). The body did not seem to have had any other clothing. It was an individual of 15 or 16 years, most probably a boy (Anatomical Section No. VIII).

Below there were two other interments, Nos. 51 and 52. The clothing of these was, however, much decomposed and could not be preserved. Also the cross No. 129 was found with an interment below this piece.

The hood, which is of fourshaft twilled frieze with black warp and mostly dark brown weft, is of the cut of type II (fig. 102, I) having shoulder gores, three at each side, two narrower and one larger one, differing slightly in position on the two sides. The point at the back of the head has been damaged, no doubt when the now missing tail was torn off. The cape is cut off straight in front. The width at the top is 29 cm., round the neck 52 cm., and along the lower edge 1.20 m.

It has been worn very threadbare by much use, on the right side at the back there is a big patch and the cape has several defects. The edge is turned under at the face, sown with two rows of backstitches and the raw edge overcast. The lower edge of the cape is ornamented with darning to imitate a cord.

No. 72.

Hood with tail taken up from the north-west corner of the churchyard from below the gown No. 34 (fig. 103, to left). It was found at a depth of abt. 58 cm. below the old surface.

It is of brown fourshaft twilled frieze, a rather finely-woven material. Its cut is of type II (fig. 102, V) the cape medium-sized, the shoulder gores unusually broad. Peculiar features are the round holes found at their upper ends, one on each side, of a diameter of abt. 4 cm. A corresponding hole is found at the same height in the seam under the chin. The holes have not been hemmed but they are undoubtedly made on purpose, the object being presumably to give sufficient width at the neck for the hood to be drawn over the head.

The width round the neck is 46 cm, along the lower edge 1.28 m., at the top 27 cm. The tail is 60 cm. long, from 4 to 6 cm. broad, made of a single strip with a seam on the under side. It is well preserved with the exception of the piece right at the top. The edges seem never to have been hemmed.

No. 73.

Hood found in the north-west corner of the churchyard at a depth of abt. 55 cm. below the old surface (fig. 104, III). It belonged to the

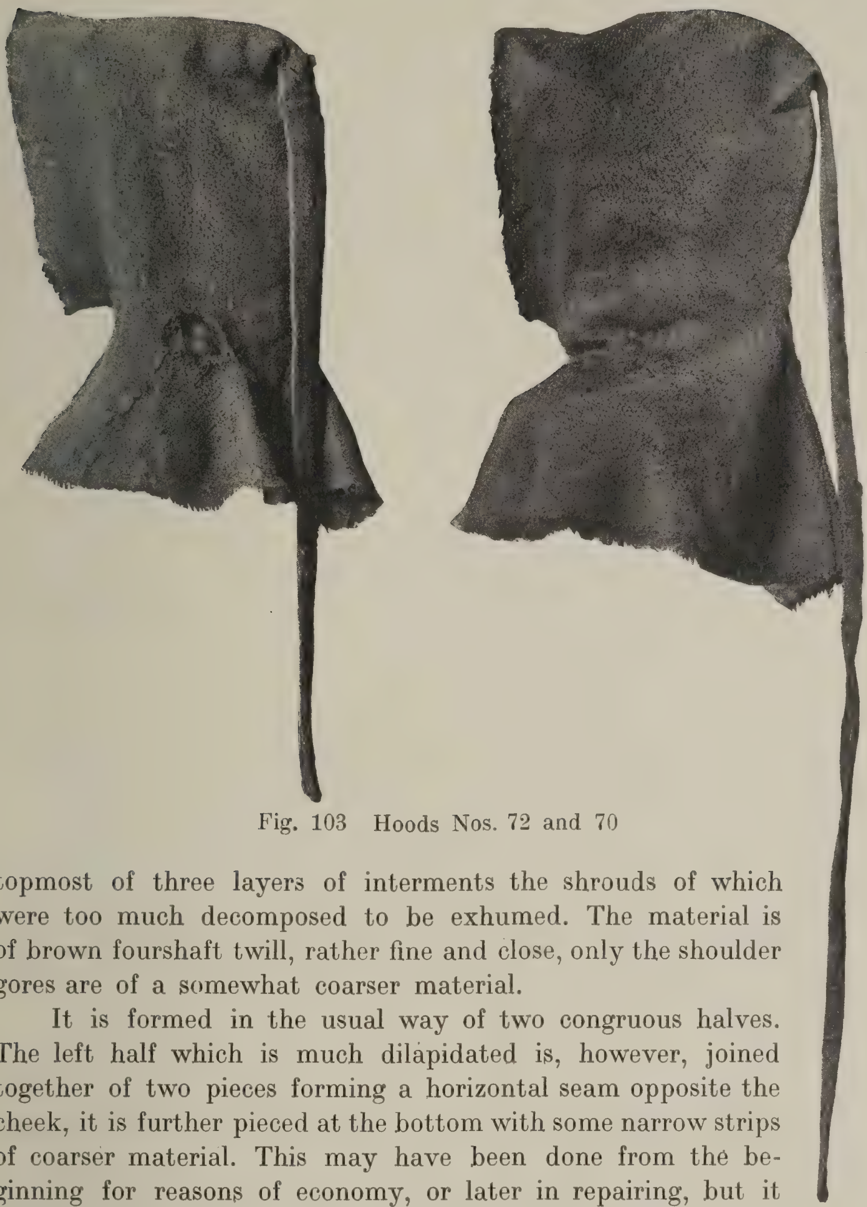

Fig. 103 Hoods Nos. 72 and 70

topmost of three layers of interments the shrouds of which were too much decomposed to be exhumed. The material is of brown fourshaft twill, rather fine and close, only the shoulder gores are of a somewhat coarser material.

It is formed in the usual way of two congruous halves. The left half which is much dilapidated is, however, joined together of two pieces forming a horizontal seam opposite the cheek, it is further pieced at the bottom with some narrow strips of coarser material. This may have been done from the beginning for reasons of economy, or later in repairing, but it does not affect the cut which is given in fig. 102, IX. At each side there is a shoulder gore with an almost rectangular point at the top. At the back of the head there was originally a tail, but it has been torn off taking with it a piece of the hood. The width at the top of the hood is 26 cm. at the widest place, round the neck it is 40 cm. in all. Only a very slightly-built person could get this over the head. The shoulder-cape is abt. 16.5 cm. long. At the front edge there is a hem with two rows of backstitches. The edge of the cape is ornamented with darnings.

No. 74.

Small child's hood of brown fourshaft twilled frieze found south-east of the church over hood No. 68 (of type I), hose No. 93 and crosses Nos. 119 and 134 together with the quite ruined fragments of a gown, as to the nature of which no details can be ascertained. It was taken up from a depth of abt. 1 m. below the old surface.

The hood is cut according to type II but the cape and its gores — of which only the left one is preserved — are unusually large. Along the lower edge it measures 1.12 m. while the width round the neck is 41 cm. The size at the top is 25 cm. No hems are preserved.

It is the only hood about which it cannot be said with certainty that it had a tail.

No. 75†.

Hood exhumed in 1900, by district physician Meldorf of Julianehaab, from the slope south-east of the church. It was lying at a depth of abt. 1.20 m. below the (modern) surface. It was acquired by the National Museum in 1913 together with a large number of incomplete pieces of gores from gowns (see above No. 57). It was only when the complete hoods were brought home in 1921 that this piece was properly understood.

The hood is of fourshaft twill, rather coarse and uneven, the colour brown. It has had shoulder gores, now both wanting, evidently it has also had a tail at the back, torn off and now missing. In cut (fig. 102, VI) it comes nearest to No. 73, it has the same easy curve at the back, but the cape is a little shorter (12 cm.). It is widest at the middle of the head where it has the normal breadth of 28 cm. The width round the neck is 45 cm. while the width at the lower edge has been abt. 82 cm. (?). All hems have come off.

No. 76.

Hood belonging to the man's gown No. 43 (cf. the same). It is of very coarse fourshaft twilled frieze with black warp and brown weft. The cut is of type II (fig. 102, III) with a medium sized cape, the upper point of the shoulder gores is rectangular. The hood undoubtedly possessed a tail, but it is now quite gone. The width round the neck is 47 cm., along the lower edge 1.14 m. At the front edge the hood is turned under and sown with backstitches. The raw edge is overcast. The lower edge is finished with darnings to imitate a cord.

No. 77.

Hood (fig. 104 No. 1) found with a number of miscellaneous rags in the north-east corner of the churchyard under the woman's dress

No. 39 and hoods Nos. 78 and 80. Inside were found skeletal remains of a grown-up man of 22—23 years (Anatomical Section No. XVIII).

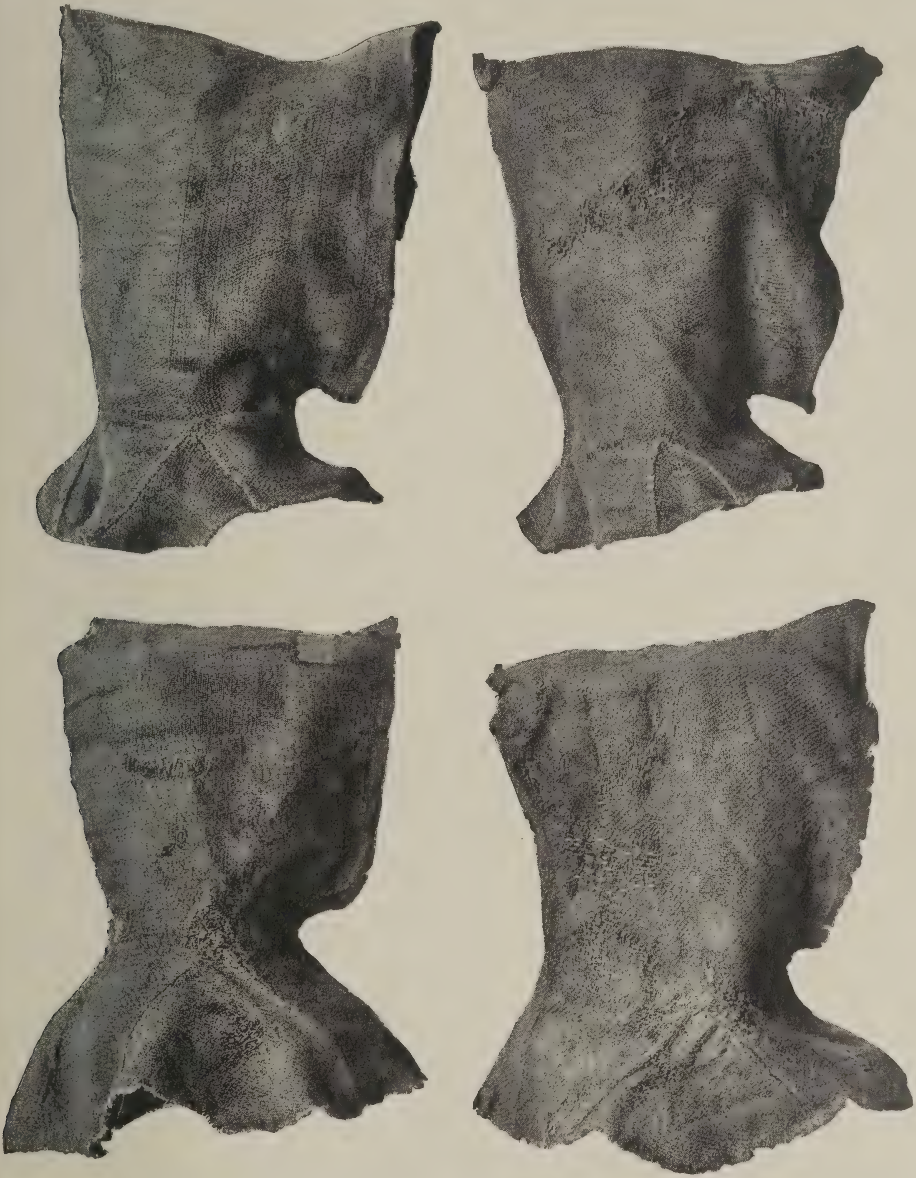

Fig. 104. Four Hoods. Nos. 77, 79, 73, and 71.

The material is fourshaft twilled frieze with black warp and brown weft. Part of the weft is much faded and has an almost pale brown effect.

The cut is of type II (fig. 102, II), the cape is rather short, a little longer at the back than in front. The gores are rectangular at the top. The pointed "horn" above the forehead is rather conspicuous. There is now no tail, but there has evidently been one, and folds and marks of wear show that it has been attached by the point of the hood being turned down over it. The edges are turned under and sown with two rows of backstitches and the raw edge overcast.

Various tears and similar damage, especially to the right half, have been repaired by sowing down the material in a pleat or a fold, thus at the crown, at the back of the head, and at one of the shoulder gores. These pleats have further diminished the width at the neck which is only 43 cm., and so the seam under the chin had burst. The width round the lower edge is 96 cm., the breadth at the top 28 cm.

No. 78.

Hood (fig. 105) found in the north-east corner of the churchyard above the woman's dress No. 39 which again lay on the top of hood No. 77 (cp. No. 80). According to the circumstances of the find it must beforehand be assumed to belong among the latest specimens, and cut and appearance corroborate this assumption.

It is in an excellent state of preservation. It was rather peculiar that, though it lay on the top of a dress in which there were well preserved skeletal remains, the state of preservation of the skeleton was, in this case, very bad. The hood belonged to a shroud, probably for a child (comp. Anatomical Section IV), which was too much decomposed to be taken up entire. A number of loose rags from it were brought home, most of them of no importance, though three of them could be identified as part of the left shoulder of dress No. 45.

The material is fourshaft twilled weaving, dark brown, the warp and the weft almost of the same colour. The cut is of type II (fig. 102, VIII) a short cape with a small gore at each shoulder, a very conspicuous "horn" in front and on the whole a very projecting front-edge, so that the face must have been almost quite concealed except when the edge was turned back. That this has often been the case is shown by marks of wear. Its greatest width from the front-edge to the back-seam is at the top, viz. 32 cm. which is much above the normal. The width round the neck is 52 cm., along the lower edge, which at the breast has the shape of an ogee arch, it is 94 cm. The tail is 68 cm. long and 5.7 cm. broad. It is made of two strips of material, one of them pieced, and has seams on the upper and under sides as in the hoods in which the tail is cut in one with the hood itself, it is attached to the point of the hood which is laid down over it (fig. 105 to right). The edges of the hood are turned under, sown with one or two rows of backstitches and the raw edge overcast. It had no patches and it was taken up

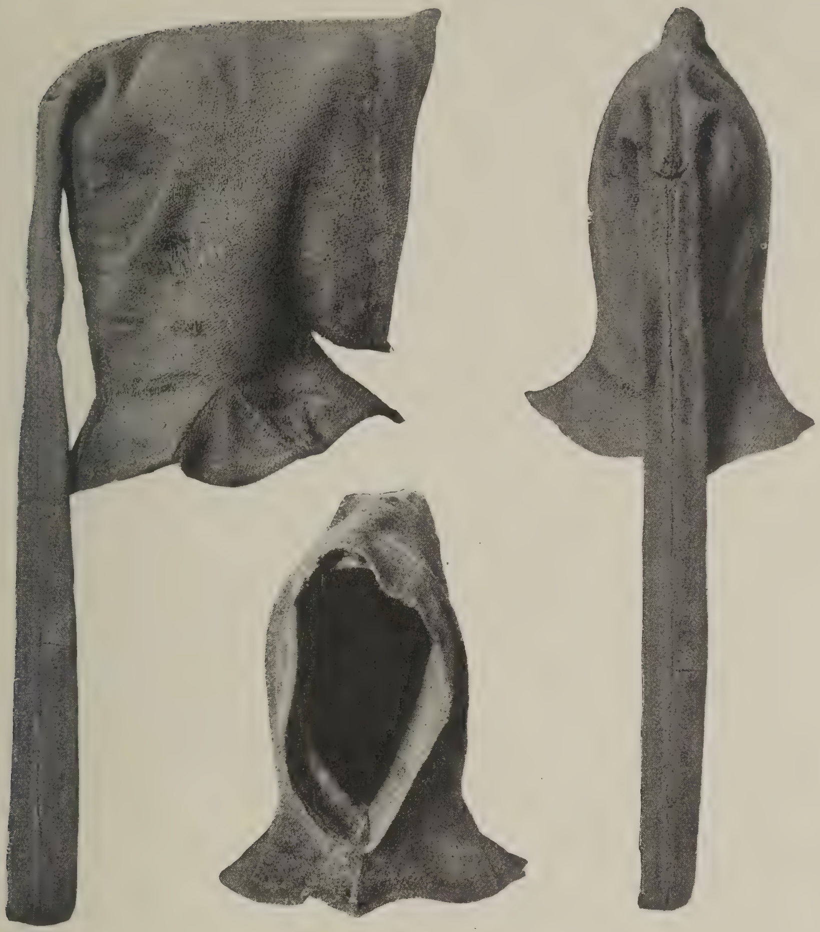

Fig. 105. Hood No. 78.

almost without being damaged. Only at the narrowest place of the neck and where the edge has been turned back from the face are there marks of wear.

No. 79.

Hood (fig. 104, II) found with some miscellaneous rags under the man's gown No. 45 in the north-east corner of the churchyard. It was taken up from a depth of abt. 1.20 m. below the old surface. It contained skeletal remains of a young woman of 20—30 years (Anatomical Section XVII). Some tufts of very fair hair were also found in it.

The material is dark brown fourshaft of medium quality. The cut is of type II but has a very small cape and small shoulder gores (fig. 102, IIII). It is very narrow round the neck (45 cm.) and it is difficult to understand how any grown-up individual, even a woman, could have got it on. That the front seam under the chin had burst when it was found is no proof that it was always thus. The width at the lower edge is 84 cm. The edges both of the cape and at the face are turned under and sown with two rows of backstitches and the raw edge overcast. A fairly pronounced horn projects above the forehead, and marks of wear show that the edge has often been turned back from the face. Only a small bit is left of the tail which has been very

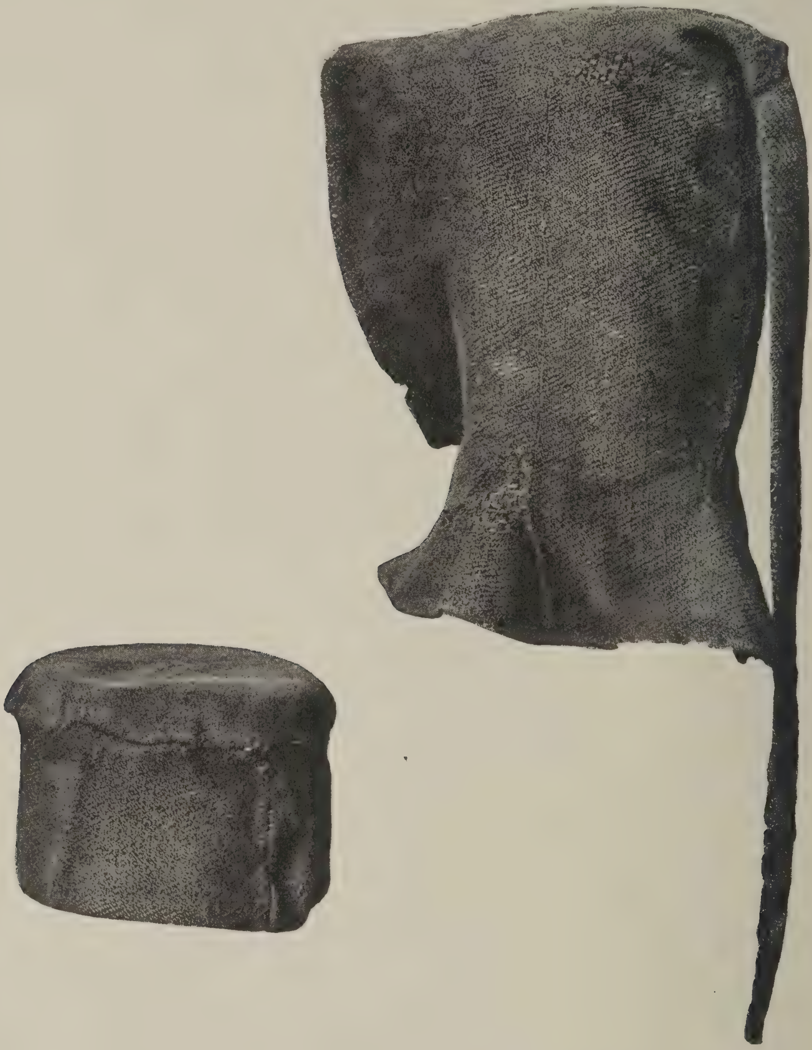

Fig. 106. Hood and cap found together (Nos. 80 and 86).

narrow, only 3 cm. at the root. The loose end of it was found among the adjoining rags.

No. 80.

Hood for a half-grown person found on top of the woman's dress No. 39 in the north-east corner of the churchyard (cp. No. 78). Inside the hood lay the cap No. 86 (fig. 106). These two pieces of headgear have thus been worn together. In the same place were exhumed some fragments of dresses of which may be noted the lower part of a sleeve with a slit 8 cm. long, two gored pieces which may possibly have formed the leg of a hose, remnants of the foot of a hose of coarse plain weaving, a bit of a tail 5.8 cm. broad. It has not been possible to put together these different fragments to form any part of a garment!

The hood is well preserved, of brown fourshaft twilled frieze. Its cut is of type II with shoulder gores (fig. 102, VII). The front outline of the cape has the shape of an ogee arch, its width at the lower edge is 70 cm., at the neck it is 42 cm., at the top 24 cm. The tail is 47 cm. long and only 2 cm. broad; it is made of a single strip with a seam on the lower side. The front edge at the face is turned under, it is sown with two rows of backstitches and the raw edge overcast. The lower edge of the cape is even more carefully finished being ornamented with darnings to represent a cord (false cord).

No. 81.

Remains of a tail-hood found north-west of the church below No. 48, at a depth of abt. 75 cm. below the old surface, much penetrated by root fibres. Very dilapidated, only the tail was fairly well preserved.

The material is of coarse unequal plain woven texture. The threads, especially of the weft, are very loosely spun. The warp is black, the weft dark brown, but now and again there is a row of quite pale brown threads in the warp.

The cut is the same as in the preceding hoods, with a rounded back portion, a small projecting horn in the forehead, with shoulder gores and presumably a short cape of which, however, nothing has been preserved. The width of the hood at its widest place at the top is 28 cm. The tail is 48 cm. long, 2 to 2.5 cm. broad and of almost the same breadth in its entire length.

No. 82†.

The end-piece of a tail formed of a single piece of brown frieze folded over once and with a seam on the under side. It was found in the store-rooms of the National Museum and originates from earlier idggings at Herjolfsnes, perhaps from Kielsen's digging in 1840.

Hoods. — Historical Part.

In itself a close head-dress of the type described in the preceding pages, with a shorter or longer shoulder-cape, is a very primitive article of clothing which may be traced far back in time. Telesphoros, a demon of healing powers in classical mythology, wears a combination of hood and mantle with a cape reaching below the knees,[1]) and a similar garment was well known to the common man in Italy as a useful protection against rain and wind. In his book on agriculture Cato the Censor advises the men on the farms to make themselves hoods against bad weather[2]) and the further we progress in time the more commonly do we find them mentioned and depicted.[3]) The Latin name cucullus (cuculla, cuculio) is not a native word, but it is a matter of uncertainty whence probably both the hood and its name are derived — perhaps from Dalmatia[4]) or possibly from Gaul, though the word does not seem to be original in Celtic either. On the other hand we learn that the Gaulish cloth industry applied itself specially to the manufacture of this article of dress which became very popular in the period of the Roman empire, and Gaul particularly abounds in pictorial representations of it. Our fig. 107 represents a small bronze figure from Trier with a particularly typical and unmistakable "cucullus". In cut it differs distinctly from the Greenland hoods which represent a later, medieval, stage. It is cut in one piece and has only a seam on the top of the head and at the front of the cape.[5])

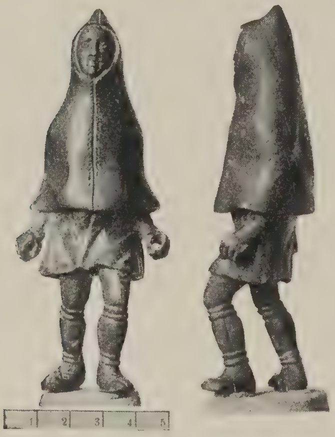

Fig. 107. Antique bronze figure wearing cucullus. Front and side view.
Trier, Provincial Museum.

Among the bog finds of northern Germany referred to the time of the Migrations, were found a gown with appertaining hood and a short skin cloak[1]) with a head piece (now in the Museum at Emden), but in none of these cases does the hood occur as a separate article of dress. This, on the other hand, is the case in a most remarkable find from a bog in the Orkneys — dating probably from the earlier Viking period — where the shoulder cape of the hood is formed of a broad border with long fringes[2]) (now in the National Museum at Edinburgh). As far as we know, this is the only real hood hitherto found in Europe, otherwise we must be content with pictorial representations as material for comparison.

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[1]) Art. Telesphoros in Roscher, Ausführl. Lexikon der griech. röm. Mythologie, esp. column 313.

[2]) Cato agr. 2, 4 cum tempestates pluviae fuerint . . . . cuculiones familiam oportuisse sibi sarcire.

[3]) Sal. Reinach, cucullus in Daremberg & Saglio's Dictionnaire des Antiquités I 1577 et seq. Mau, cucullus in Pauly-Wissowa, Realencyclopädie der Alterthumswissenschaften. Cfr. also Thesaurus linguae latinae.

[4]) See Reinach, l. c.

[5]) For two other antique bronze figures with similar hoods, one in Vienna, the other in Thorvaldsen's Museum in Copenhagen, see S. Reinach, Statuaire grecque et romain II, p. 469.

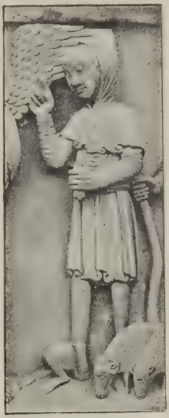

Fig. 108. Shepherd with hood, sculpture from the West Portal of the Cathedral of Chartres (12th cent.)

Hoods of the same shape as that worn by the small bronze figure from Trier we meet with century after century throughout the Middle Ages, especially in pictures of shepherds and travellers. It is the French *chaperon* (diminutive of *chape*), the German *Kogel* (from lat. *cucullus*) or *Kapuze* (lat. *caputium*), the English hood — from which Robin Hood got his epithet — and the Northern *hetta*. The shape of the hood in the 12th century is to be seen in fig. 108 originating from the West Portal of the Cathedral of Chartres. It is narrower in the neck than the *cucullus* of the ancients and must presumably be cut of two halves, but it has the same short point at the back of the head.

In the 13th century the back part of the hood begins to be expanded into a pendant point, still very unassuming in comparison with the fashion of a later age.[3]) It may be described as bag-shaped or funnel-shaped, it is a simple continuation of the hood and may be used to keep money in or other small objects.[4])

Not until the 14th century comes the golden age of the hood. When it is stated in Danish annals that in the beginning of the 14th century "the Danes first began to use a species of head-dress called

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[1]) Hahn in Mannus, Ergänzungsband II, p. 21 seq.

[2]) J. Anderson, Scotland in Pagan Times. The Iron Age (1883) p. 103 seq.

[3]) This shape we find among the later sculptures of the Cathedral of Chartres, in a representation of Mardoch causing the repeal of the edict against the Jews to be announced (North Portal, 13th cent.).

[4]) A point remarkably long for this period is found in a representation of the "shepherds in the field", on a copper-gilt antependium from abt. 1225 in the National Museum in Copenhagen (originally from Ølst church in Jutland) see fig. 109. The back of the hood is here extended into a tail which has reached to the shoulders when the hood was drawn on. I know of no other case from the 13th cent. where so long and narrow a tail has been used. Here, however, we have no real hood, but a peculiar head-dress, the shoulder-cape of which is open at the sides right up to the shoulders. Cp. Viollet-le-Duc: Dict. du mobilier franç. III, art. Gonelle.

kappehætter ("cape-hoods") covering not only the head but also surrounding the breast",[1]) this cannot be understood as an absolute statement, it is impossible that such an article of clothing should not have been known before in the North. It can only be meant that it was universally adopted by all classes at that time and, it should be noted, not only as a travelling-dress.[2])

Hitherto the hood had principally been worn by the lower class, now it happens that in the beginning of the 14th century it is adopted by the upper class in whose wardrobe it becomes throughout the 14th century and, in a somewhat altered shape, in the 15th century one of the most characteristic articles of dress. It was by no means confined to travelling-wear only. About the year 1400 Pierre Salmon could wear it when he obtained audience of the pope.[3])

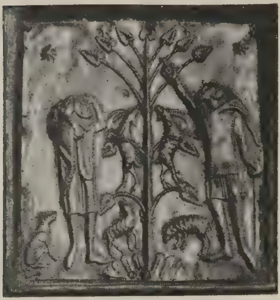

Fig. 109. "The shepherds in the field" (abt. 1225). A representation from a copper-gilt antependium in the National Museum, Copenhagen.

"The real distinguishing feature of the Gothic dress", this hood has been called in its new shape transformed to meet the exigencies of fashion,[4]) its chief peculiarity being the long tail or liripipe hanging down the back. It is now no longer a funnelshaped expansion of the back part of the hood, but a ribbonshaped appendage[5]) into the practical value of which it will be best not to inquire too closely, but whose ornamental qualities were all the greater. It could be wound round the neck and head[6]) and thus, we may suppose, be to a certain extent useful by keeping the hood on firmly, and keeping out the wind. It might also be draped round the shoulders or pulled under the belt, especially when it grew so long that it was in danger of trailing along the ground. This latter inconvenience was sometimes avoided by tying it in a knot. The fops among the clergy made it an excuse for wearing long tails to their hoods that they wrapped them round their hands to protect them against the cold, but this argument was peremptorily rejected by the synod of Cologne in 1337.[1])

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[1]) Peder Iversen's notes 1266—1537, abt. the year 1307. (Rørdam, Hist. Kildeskrifter I 271). Huitfeldt, Danmarks Krønike III, 84.

[2]) Cfr. the Austrian Anonymus Leobiensis to the year 1336 (Pezii Script. rer. Austric. I 948): Capuciis etiam omnes inceperunt uti tam rustici et Judei et pastores.

[3]) Couderc, Album, pl. LXI.

[4]) P. Post, Die französ. niederl. Männertracht p. 31. Cp. Fairholt, Costume p. 113 seq.

[5]) Cp. Couderc, Album, pl. IX, 2 and XVII where the contrast between the two types is clearly seen.

[6]) Brit. Mus. Sloane Ms. 346 fol. 5 (Fairholt p. 93). Collect. Martin Le Roy fasc. II. pl. XIX, 37. Couderc, Album, pl. XLVII (beginning of the 15th century). Cp. Chaucer, Reeve's tale v. 3952 f.: On holy-dayes before her wold he go with his tipet bound about his head.

Sometimes the edge of the hood was cut into scallops or points both round the face and on the cape and sometimes, when it was warm, it was worn in reverse fashion so that the aperture for the face was laid round the head, and the cape and tail hung down behind.

This fashion has been shown by Enlart (p. 154) to exist as early as the close of the 13th century, but it was not until the 15th century that it became the conventional way of wearing the hood. The original aperture for the face was then transformed into a broad, thick padded roll fitting firmly round the head. It was now like a turban with a large drapery.

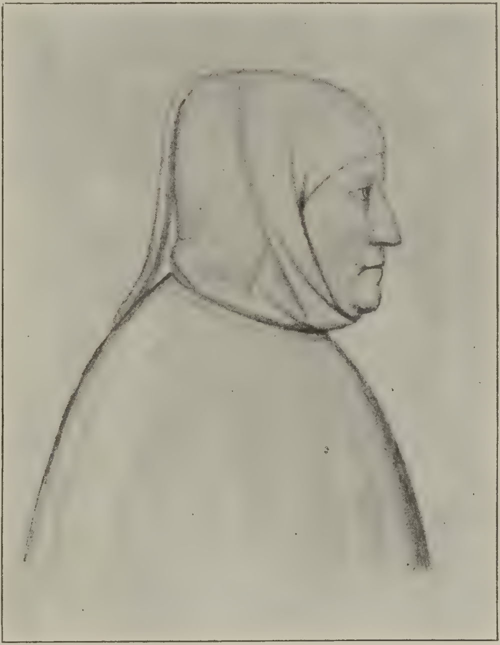

Fig. 110. Earliest portrait of Petrarch, probably executed in 1379.
Couderc: Album des Portraits.

In Greenland, however, it never reached this last stage of development but retained the form of a simple hood or chaperon with a tail. In this long-tailed shape we do not find it in writings and pictures until the middle of the 14th century.[2]) In the sumptuary laws with which not only the ecclesiastical councils and the statutes of the orders of knighthood but even the civil authorities of the towns and the English parliament were so fond of occupying themselves in the 14th century — probably without any noteworthy result — we repeatedly find decrees regulating the length and breadth of the tail.[3]) In the statutes of the French equestrian order of the Crown of Thorns given abt. 1400 it says that the hood pertaining to the dress of the order must be so wide at the neck that it may be pulled over the head without being slashed or buttoned under the chin. The tail, which is sown double and of a width of three fingers, must not exceed $1^1/_2$ feet in length.[1]) And similar decrees of course accompanied the fashion and its exaggerations to the North. In Iceland the bishop of Skalholt issued a decree in 1359 forbidding priests and deacons to wear hoods with tails more than two fingers wide or one ell in length.[2])

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[1]) A. Schulz, Deutsches Leben, p. 289 seq.

[2]) The council in London in 1342 mentions "caputiis cum tipettis miræ longitudinis", hoods having tippets of a wonderful length. See Jusserand, Wayfaring Life, appendix VII. Cp. above note 1 for the synod of Cologne, 1337.

[3]) Falke, Mitteilungen der Centralkommission vol. V, p. 221.

In the Danish folk-song of Queen Margaret and the Swedish King Albret of Mechlinburg[3]) he makes a vow not to wear his hood before he has conquered Denmark, but when Queen Margaret had captured him in 1389 she made return by having a hood made for him of 15 yards of frieze.

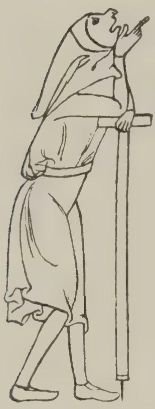

Fig. 111. Gylfe of the Edda (beginning of the 14th cent). From a drawing in Cod. Upsal. 11, 4to.

Now bring me fifteen yards of frieze
to cut that prince a hood,
Then lead we him to Mechlinburg
and add there a tippet good.

King Albret gangeth on Copenhagen street;
full lordly did he fare,
A train of fifteen bonnie knights
the tippet on a staff did bear[4]).

When we try to estimate the age of the Greenland hoods on this general historical background, we are fortunate in being able to follow the transition from the earlier type with the baggy back-part to the new fashion from the middle of the 14th century, having the narrow, ribbonshaped tail. We possess in the find a single specimen, No. 65, the back and tail of which differ from all the others, the tail being actually bag-shaped, its interior being connected with the interior of the hood so that they form, so to speak, one organism even if the tail is cut separately and joined on to the flat back-part. A comparison between this hood and one represented in an Icelandic manuscript from the beginning of the 14th century (fig. 111) will be instructive, and our hood has therefore been arranged in fig. 112 in a similar position to that worn by Gylfe in the manuscript. It will be seen that not only the tail is nearly the same but the shoulder cape, too, is of a similar shape, short and narrow in front and over the shoulders, but falling far down the back. The similarities are so striking that we may venture to refer this single hood to the first half of the 14th century.

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[1]) Quoted by Ducange, Glossarium mediæ et infimæ latinitatis, art. caparo.

[2]) Dipl. Isl. III. 129. Cp. Dipl. Norveg. II 302 (1364) rykti hann sva, at af gekk struttrinn af hettuni. Hj. Falk, Kleiderkunde p. 94 seq.

[3]) Sv. Grundtvig: Danmarks Folkeviser III p. 583.

[4]) Translated by Niels Møller.

All the others, however, are modelled on the new type which made its appearance in Europe towards the middle of the century and which we found mentioned in Iceland in 1359.[1] In Danish wall-paintings it often occurs in the second half of the 14th century.

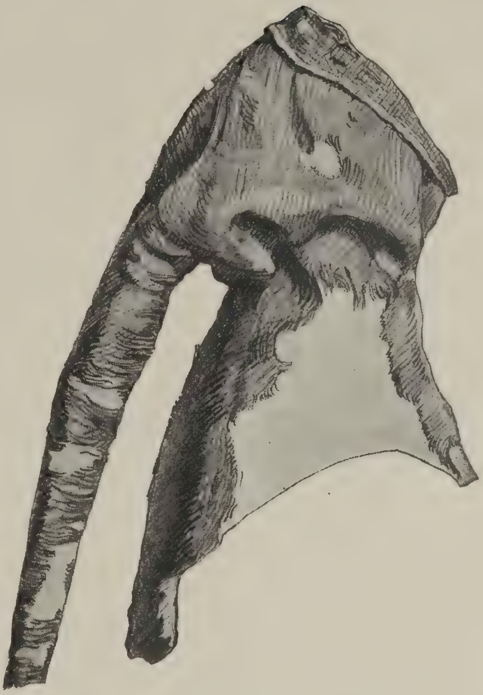

Fig. 112. Hood No. 65. Side-view.

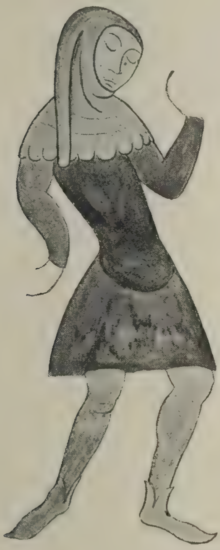

Fig. 113. Figure from the dancing-chain in Ørslev church (Seeland). Abt. 1375.

We saw in the preceding part that the hoods might be divided in two groups according to their type of cut. In one group the tail is mostly cut entirely or partly in one with the two halves of the hood, i. e. it is still understood to form part of the hood itself — an excrescence on it — even though it is so thin that there can be no question of a hollow space within it communicating with the interior of the hood. The shoulder-cape which is comparatively large obtains the desired fulness by a very slanting back-line. Of this design we may say that, in addition to being graceful in line, it is very extravagant, a large piece of material being cut away between the tail and the back-part, and when we compare it with type II in which the front edge and back line are almost straight and parallel, and nothing is wasted because the whole of the shoulder width is obtained by letting in gores, we cannot but think that the latter type is a subsequent practical improvement. And this improvement is not only a saving but ensures a better set, the fulness of the cape coming just in the proper place i. e. over the shoulders. Also the slenderness of neck so eagerly aspired to by gentlemen of fashion was more easily obtained in this way, the earlier type of hood being apt to be baggy and superfluously full in this part. In type II the tail is always made separately and joined to the hood by the point of the latter being laid over it, a method which we recognise in French pictures from about 1400.[1])

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[1] Cfr. an Icelandic miniature from abt. 1360 in the so-called Skardsbok, A. M. 350 fol., University Library, Copenhagen, depicted in H. Fett, Norges Malerkunst p. 202.

If we assume that the hoods of type I, apart from the one already mentioned, belong to the latter half of the 14th century, while type II dates at the earliest from the close of that century, this must, I think, be said to be a reasonable estimate. However, one of these later hoods was found, covered by several layers of more recent interments, under the dress No. 39, which again lay under the two hoods Nos. 78 and 80. With these latter we must then presumably have progressed at least some way into the 15th century.

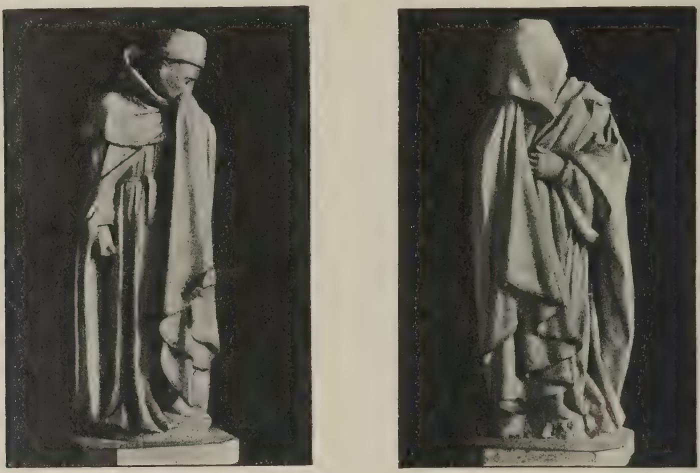

Fig. 114. Weepers from the sarcophagus of Jean-Sans-Peur, Duke of Burgundy (abt. 1425).

In reality we cannot fix any limit for the use of the tail-hood in Greenland after it was once adopted. In so remote a part of the globe one might beforehand expect that fashions once adopted and grown popular would long persist. It is in this way that the old upperclass fashions of former centuries have been preserved in the national dresses of the peasantry. But apart from this point of view which opens up almost too wide a range of possibilities, it is a fact that, among the kinsmen in Scandinavia, tail-hoods of this shape could be worn throughout the 15th century without becoming antiquated. In the leading centres of culture the fashions change, of course, and hoods of our type are found chiefly as a kind of processional uniform at funerals, well known from the famous "weepers" on the sarcophagi of the Burgundian dukes (fig. 114). Here the hoods produce the chief effect, swaying the mood wonderfully from jest to tears.[1]) If now and again we find them as late as the 16th century[2]) they were, at any rate, no longer in fashion. But this does not hold good for the North. In Denmark we find a characteristic specimen on the small carved female head on the stalls in Roskilde cathedral, executed in 1420 (fig. 115), and among the wall-paintings from abt. 1475 in Tingsted church on Falster we find a representation of the wealthy worldly man (fig. 116) wearing just such a tail-hood over his shoulders as we know from the 14th century. On a wall-painting from abt. 1500 in Aarhus cathedral the prophet Isaiah wears a tail-hood, having the aperture for the face over the head and the shoulder-cape draped down the back (fig. 117), but in this case there is of course some probability that the venerable prophet was equipped with a somewhat archaic dress. Nevertheless it may be established as a fact especially on the basis of the Tingsted painting, that tail-hoods of the type found in Greenland were worn in the North during most of the 15th century.

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[1]) Couderc, Album des Portraits pl. LXI (abt. 1410). Brussels, Bibl. Royale 10958 (abt. 1449).

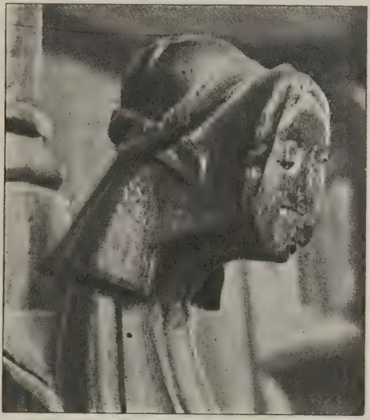
Fig. 115. A carved female head with tail-hood, from the stalls in Roskilde cathedral near Copenhagen (executed 1420).

Hoods, with or without a tail, were worn by both sexes, by men as well as women.[3]) There can hardly be any doubt, however, that the great majority of the Greenland hoods are male hoods, for the

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[1]) The monument of Philip the Bold from the beginning of the 15th century and that of Jean-Sans-Peur from the middle of the century, also that of the Duke of Berry from the same period. On Philippe Pot's tomb from abt. 1480 (in the Louvre) we still find the tail-hoods, but with very broad tails.

[2]) Simon of Cyrene on a passion-altar executed in Antwerp (abt. 1520) in the Kaiser Friedrich Mus. Berlin. Joseph of Arimathea on an altar-piece from Amelsburen (abt. 1475) in the Landesmuseum, Münster. In the same place a representation of the death of St. Nicolas. In a picture by Brueghel in Museo Nazionale, Napoli ("L'eresia"), dated 1565 a monk or hermit wears a tail-hood of quite the same sort as those from Greenland, but it is evidently the dress of his order. The same is the case with the monk seen in the foreground of Brueghel's Shrovetide-picture in Vienna.

[3]) Falk, Altwestnordische Kleiderkunde p. 97.

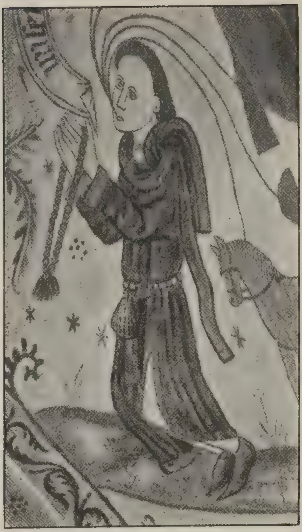

Fig. 116. The rich man kneeling before Christ (abt. 1475). Wall painting in Tingsted church (Falster, Denmark).

simple reason that they are so narrow in the neck that a woman with her abundant hair could not possibly have drawn such a head-dress over her head. The women's hoods were open under the chin (cp. fig. 115) though probably they had buttons and could be fastened at will.[1] While such an arrangement is never found among the hoods from Herjolfsnes, there is however one, already mentioned above, and that the oldest of them all, which is so capacious that we are tempted to assume that it was meant to cover a woman's hair. This is all the more probable since the skeletal remains contained therein were those of a very small and slight person who may then be compared with the woman from Rouen mentioned in our note 1.

As we said above, gentlemen of fashion in the upper classes gave the tail-hood its characteristic shape in the 14th century, and from them it spread to the other classes of society. But this type of hood was never, or only very late, adopted by the common people, a fact that must be strongly emphasised in its bearing on Norse culture in Greenland. Wherever we see the various social orders depicted together or separately, the tail-hood is the distinguishing badge of the wealthier classes[2]) (fig. 90). The hoods of the common people have no tail or only a short baggy one (fig. 92).

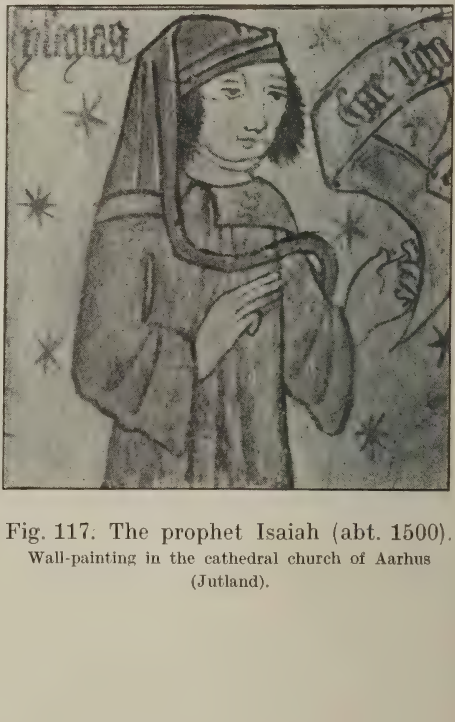

Fig. 117. The prophet Isaiah (abt. 1500). Wall-painting in the cathedral church of Aarhus (Jutland).

In the North, too, this distinction between the dress of the common people and the better classes was retained. The long-tailed hood, as far as I can see, is exclusively reserved for the latter. Among others we shall here again call attention to the painting in Tingsted church (fig. 116), in which the rich and the poor man are kneeling in prayer before Christ — with differing degrees of devoutness. The object was here directly to emphasise the social contrast by means of the costume, the rich man has therefore been furnished with a tail-hood. The fact of its being an upperclass head-dress could not have been more clearly illustrated.

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[1]) Collect. Gaignières IV. fol. 39 and 41. VI. fol. 159. In vol. V fol. 90 of the same is represented a bourgeoise of Rouen (d. 1370) who apparently wears a real closed hood fitting tightly round the face but having rather a wide neck. The knots of hair at the ears are very plainly seen through the hood.

[2]) Cp. Coll. Gaignières vol. IV, a series of pictures of the social classes from a manuscript from 1372. Wolfskron, Die Bilder der Hedewigslegende nach einer Handschrift v. J. 1353 (1846) column 89 seq. E. Markert, Chaucers Canterbury-Pilger und ihre Tracht (Diss. Würzburg 1911) p. 22.

Caps. — Descriptive Part.

Of caps five in all have been found, but four of them form a special group. They are cylindrical and of a quite simple cut having a round crown and a rather deep rim. Two of them had belonged to adults, but one was so dilapidated that it could not be preserved. The third one belonged to a half-grown person and the fourth to a small child. In the two specimens the lower edge is turned under in a broad turning not hemmed; it is tempting to believe that the caps have originally had a fur lining to which this turning was attached.

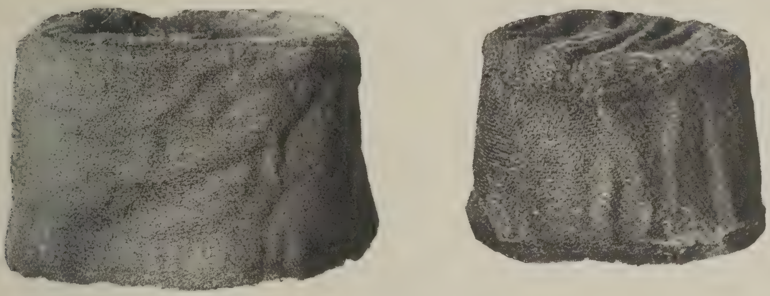

Fig. 118. Two caps, Nos. 83 and 85.

The fifth cap is more than double the height of the others and is not cylindrical but conical. Its upper part is, however, made in quite the same way as the more low-crowned caps. This very remarkable and significant piece is an entirely isolated form, and must speak for itself. The reader is referred to the description below and to the treatment in the historical section.

A peculiar fact as regards the crowns of the caps is that they consist of two halves though the piece required for the entire crown is naturally quite small. If we only possessed the two caps for adults, viz. No. 83 in which one half is almost whole while the other is worn through twice and repaired a third time, and No. 84 where there is a similar contrast between the two halves, this would not seem so remarkable. It might then be supposed that something had been carried on the top of the cap causing wear on one side which had then often to be renewed. It might be a helmet, a milkpail or something similar. However, even the infant's cap has its crown divided into two halves, the same is the case with the high conical cap on which there can hardly have been carried anything, and finally, the cap No. 86 has its crown divided by a false seam. It was a fixed rule, then, that the crown was to be, or look as if it were, divided in two, but the deeper meaning of this we are, unfortunately, unable to explain.

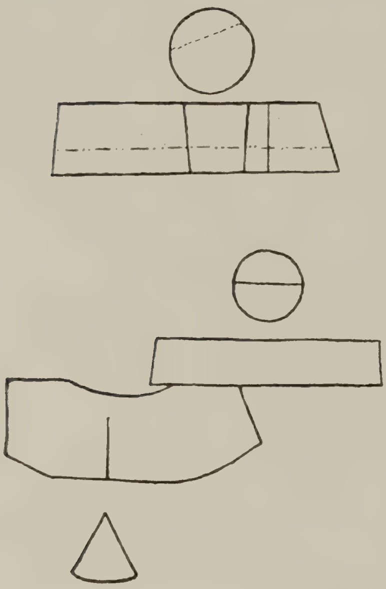

Fig. 119. Diagrams of caps. $({}^{1}/_{15})$. Nos. 86 and 87.

No. 83.

Cap (fig. 118, to left), belonging to dress No. 40 as described above. It is of fourshaft twilled frieze of a darkbrown colour. Its separate pieces are of different closeness of texture. In shape it is almost cylindrical. The rim, which is turned under in a deep turning on the inner side without being hemmed, is from 10.5 to 12 cm high and consists of a single long square piece with narrow gore added. The crown (diam. 17,5 cm.) consists of two almost equal halves. One of them, which is almost opposite the gore in the edge, is fairly good; the other one, on the contrary, is quite worn through, it has then been mended with a patch that was also worn through, and finally with a fresh patch of closely-woven material answering to that of the rim. Each time the patch has been put on under the damaged part which has been allowed to remain with its sadly frayed edges. The rim of the cap, too, has big holes.

No. 84*.

Cap found with dress No. 54 in the western part of the churchyard. Its condition was such that though it could be examined it could not be preserved.

The round crown, the diameter of which was 14.5 cm. was composed of two pieces of unequal size, the larger piece being much worn, the smaller one quite good. The rim was 10 cm. high with the same wide unhemmed turning at the bottom as was found in two other caps.

No. 85.

Child's cap (fig. 118, to right) from an interment west of the church above the man's gown No. 43 which again covered No. 49 with cross No. 151.

Its material is of dark brown fourshaft weaving, and it consists of an oval crown made of two crescent-shaped pieces, and a rather high rim (almost 10 cm.) consisting of a single piece 24 cm. long.

The little child that had been buried in this cap was wrapped in a shroud consisting of two pieces, a thin piece of fourshaft weaving, wrapped round the waist, of a pale brown colour, and a very coarse dark brown piece of plain weaving encasing the legs. Both pieces seem to be fragments torn off at random from the lower part of two different children's frocks. The thin piece, which is in a very bad state, almost falling apart, is sown together of five different gores, the coarser piece of three gores. These fragments show no special features.

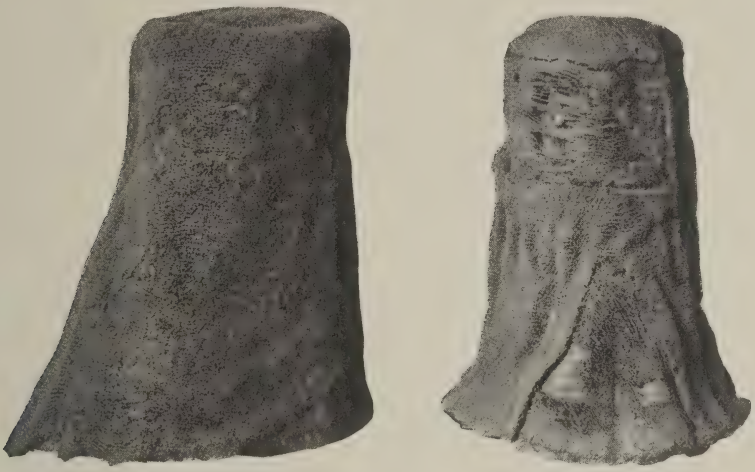

Fig. 120. Cap No. 87. Side- and back-view.

No. 86.

Cap for a half-grown boy found inside hood No. 80 to which we refer the reader (fig. 106).

The cap is of fourshaft twilled frieze, brownish, but the various pieces differ slightly in shade. It is cylindrical. Its rim is from 8 to 9.5 cm. high, the crown is circular, 17—18 cm. in diameter. The rim is composed of no less than four different pieces and is turned under at the lower edge in a broad turning that seems never to have been hemmed. The crown is made of one piece, but divided into two unequal-sized halves by a false seam (fig. 119, top).

No. 87.

A high conical cap found in the south-western part of the churchyard on top of another piece which must be assumed to have been some article of headgear as teeth were found inside, but which perished beyond recovery in the attempts at conservation (fig. 120).

The material is an exceptional case of plain weaving, coarse and open, brown of colour. It consists of a cylindrical upper part formed as in the above-described caps of a round crown of abt. 14 cm. in diameter and a rim abt. 7 cm. in height, but to this rim is added another more than double its height, which has a gore inserted at the back of the head. The full height of the cap is thus 25—30 cm.

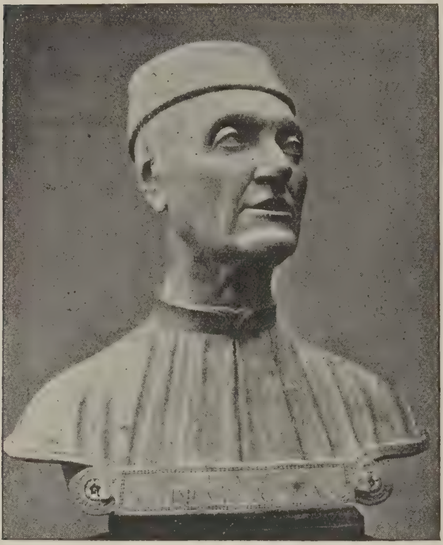

Fig. 121. Italian marble bust from the 15th cent.
Berlin.

The crown is composed of two unequal-sized pieces in the same way as the small caps. The lower edge is worn off and the state of preservation is on the whole not very good. The cap cannot have had any deep turning on account of the gore at the back, but there are indications that a quite narrow edge has been turned under, deepest in front, narrower and narrower towards the back. The part above the forehead is unfortunately missing.

The cap has ascended in a steep line from the forehead while the line at the back is slanting owing to the gore. The cap is very large at the lower edge (68 cm.) so large that we are tempted to take it for a woman's cap. However, the men of the 15th century wore a wealth of hair, and the whole type is in excellent agreement with the tall male caps that were the fashion in the time of Louis XI known to us from Northern pictures from the close of the fifteenth century.

Caps. — Historical Part.

If the tail-hoods were distinctive, the small round caps, on the other hand, are uncharacteristic and would seem to be of no particular period. When we consider their cut, a circular crown with a simple though rather high rim sown on to its edge, they must be regarded as so elementary that any age could have invented them.

This may be right in principle, but considering the extraordinary amount of medieval illustrations at our disposal, we shall be justified in enquiring if such caps may be shown to have existed in all ages. And our answer must be that this is by no means the case. The cylindrical caps with the flat crown are in reality limited to just as definite a period as the tail-hoods. They belong to a somewhat later age, in Europe we meet with them from the close of the 14th until some way into the 16th century, and they are always worn by men and boys only, never by women. In the previous period just as simple head-coverings were worn but of another shape — low, hemispherical caps, often rising to a little point in the middle,[1] or the close-fitting *cales* so popular throughout the Middle Ages, descending in two ribbons tied under the chin[2]. Flat-crowned caps are no rarity either, but they have always a wide turned up edge, often slashed (*toques à revers*).[3]

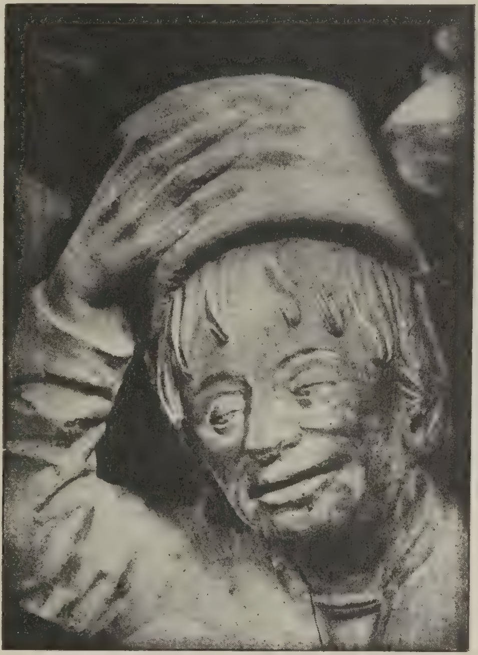

Fig. 122. Cathedral of Amiens. Figure from the sculptures of the wall of the inner chancel (abt. 1500).

But within the same period we shall look in vain for a cap like those from Greenland with a simple steep rim, so tall that it is with difficulty prevented from sinking into a fold. In the 15th century, on the other hand, we find them by the hundred — on Italian marble and terracotta busts (fig. 121) or medals,[4] in portraits, especially of young men, in French and German paintings and sculptures (fig. 122) far down into the 16th century.[5]

The circumstances of the find confirm the assumption that the

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[1] Enlart, figs. 122—27.

[2] Ibid. figs. 120—21.

[3] Ibid. figs. 128—29.

[4] e. g. the humanist Pietro Candido Decembrio (d. 1447), medal by Pisanello.

[5] One of the earliest examples known to me is a diptychon of ivory of the 14th century, from southern France, in which Malchus wears a cap of this kind (London, Wallace Collection). Further: A portrait in the Germanisches Museum at Nürnberg (Gemälde Katalog 207). A painting of the school of Hieronymus Bosch, Christ questioning the Doctors, in Louvre.

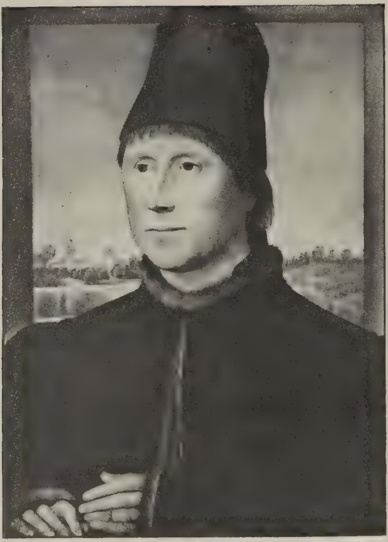

Fig. 123. Hans Memlinc: Portrait of a man (abt. 1480).
Frankfort, Städelsches Kunst-Institut.

caps are among the latest of the articles from Herjolfsnes. No. 85 belongs to a top layer west of the church, above the dress No. 43 with appertaining hood. No. 86 was found inside hood No. 80 in a layer above dress No. 39 and hood No. 77, and we may note in this connection that the Burgundian "weeper" reproduced in fig. 114, to the left wears a cap and hood together. No. 83 and No. 84, on the other hand, were found with later interments above them.¹)

If we must show a certain discretion in regard to the small cylindrical caps, and not rely too much on them in attempting to fix the date of our find, this is not necessary in the case of the solitary, tall, conical cap. It was exhumed from surroundings giving no clue to its relative or absolute age, but in itself it is so characteristic that it is not difficult to place. Its impressive height and broad back part point to the middle and the latter half of the 15th century, and most probably it is a man's, though the women of that period wore similar erections usually covered with a veil of lawn.²) It was very fashionable in the time of Louis XI and Charles the Bold, and may be said to be a special

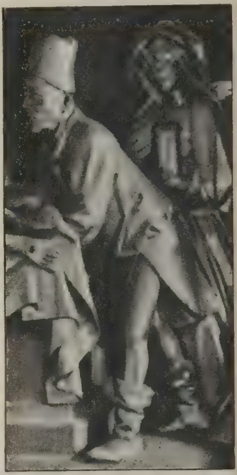

Fig. 124. Figure from a representation of the Entombment (abt. 1500).
Detail from the altar-piece in N. Broby church (Funen Denmark).

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¹) A small carved bone head from Kilarsarfik in the old "Vesterbygd" brought home by Daniel Bruun, seems to be wearing one of these cylindrical caps. As the "Vesterbygd" is usually assumed, from Ivar Baardson's account, to have perished in the middle of the 14th century (Dan. Bruun: The Icelandic Colonization of Greenland p. 131 seq.), we should here have a terminus ante quem for the appearance of the caps. On the other hand, the little head, from its general character, gives one the impression of dating from the late Middle Ages and it may be questioned whether we are to ascribe most evidential force to the head or to Ivar Baardson. In any event, the proof hangs by so thin a thread that decision must be reserved till further investigations of the ruins of the "Vesterbygd" have taken place.

²) The tall caps without veils worn by Icelandic women in the 16th century answer more closely to the caps from Greenland than those worn in Europe in the 15th century. See AM. 147, 4to fol. 149 r and 223 r.

feature in the pictures of Dirk Bouts (d. 1475) and other painters of the early Flemish school. In fig. 123 we give a portrait by Hans Memlinc.[1]) In the North it may be shown to have existed at the close of the 15th century (fig. 124)[2]) and, at any rate, we can hardly imagine it having reached Greenland before that time. It will then be one of the specimens serving to give the latest date for the find and the interruption of the intercourse with Europe.

Hose.

Six specimens of hose have been found, differing considerably from each other, and as a rule not very well preserved. They are all of woven material, mostly coarser than that employed for the gowns. In two cases plain weaving has been used.

No. 88 is a pair of long-legged hose to cover the entire leg, the others have only reached to below the knee and are found of three types: 1) with a foot, 2) with a strap instead of a foot ("stunt hose"), and 3) of the gaiter-type, entirely without a foot.

No. 88.

A pair of long-legged hose (fig. 125, to left) found with one part of the man's gown No. 45 in the north-east corner of the churchyard. They are of coarse fourshaft twill; one of them is fairly well preserved though the toe is wanting; of the other only the foot and the upper edge remain.

The leg is so long that it has covered the entire limb (98 cm.). In front it ends in an almost rectangular point which must have been attached to the belt or to the drawers. It is cut of one piece joined by a seam down the back of the leg. This is done in a somewhat curious manner, the two upper corners not being placed exactly opposite each other, but one end being drawn up above the other and joined on to the upper edge of it (see diagram fig. 126, IV). It is done in the same way in both hose and must consequently have been done on purpose, presumably to strengthen the seam. The leg has two slits at the bottom and the two outer flaps are joined behind and below the heel. They are not equally long but this inequality in length is adjusted by the above-described way of joining the leg at the top. The front flap between the two slits has lain across the instep but is unfortunately incomplete in both the hose. The foot with the gradually narrowing toe is attached to the free edges of the two outer flaps. It consists of two halves

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[1]) Further references: Brit. Mus. Ms. Harl. No. 4376, depicted in the Journal of the Archæol. Assoc. I p. 25 (1845—46). Katalog der Lipperheide'schen Kostüm-Bibliothek I p. 171 and 226.

[2]) Cp. the wall-paintings from 1474 in Jetsmark church (Jutland). See also the Swedish paintings from Kumla church (1482).

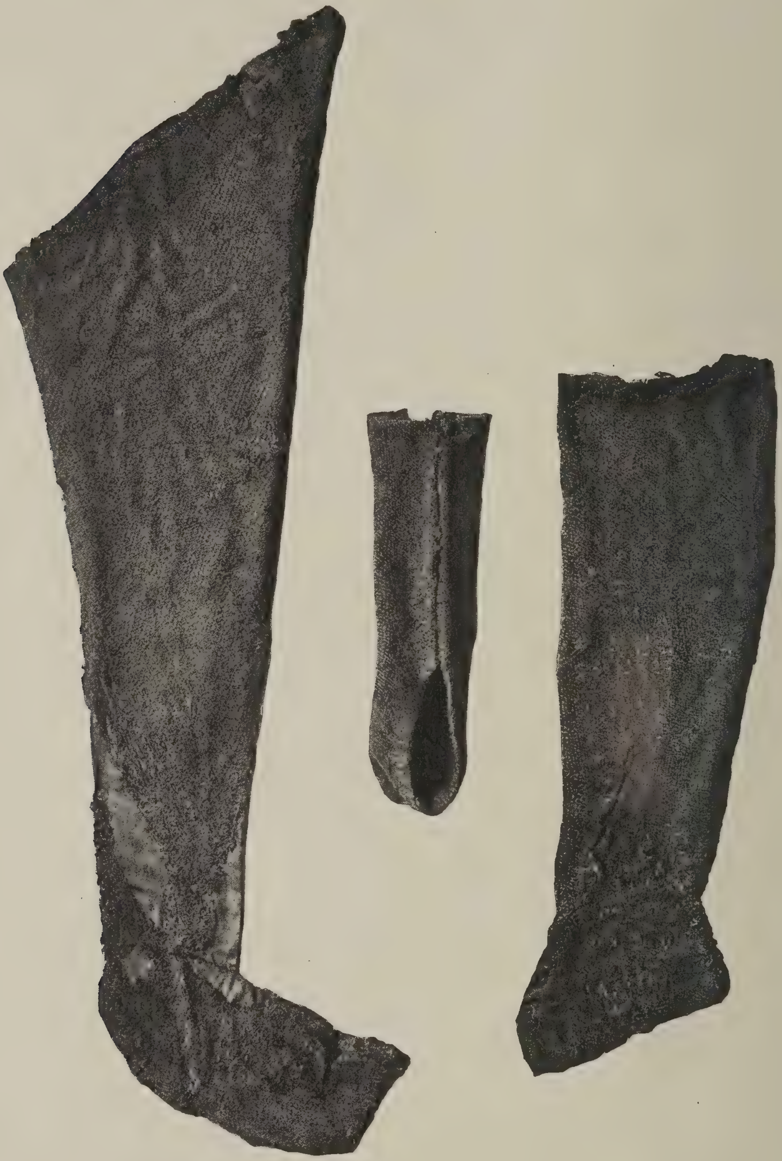


Fig. 125. Three hose of different lengths. Nos. 88, 92, and 90.

joined together in seams on the upper and under side of the foot. That one side of the foot consists of two pieces, and that likewise one flap of the leg is pieced under the heel, has presumably nothing to do with the original cut, but is a result of later repairs. It is peculiar that the seams are placed under the foot — in the hollow of the sole there is a regular knot of seams.

No. 89.

Remains of hose that could not be restored to an entirety though there are details of interest. Taken up west of the church where it was found at no considerable depth.

The material is fourshaft weaving of medium quality almost as in No. 88, the warp almost black, the weft a paler brown. It belongs to the same type as No. 88 in cut. Leg and foot are cut separately, the heel in one with the leg, not with the foot. The upper edge of the leg is overcast with large, very coarse, stitches, like No. 90. The most peculiar part, however, is the foot. Although it is very fragmentary, we may infer that, apart from gores let in at the back, it has been formed out of a single piece with a seam along the sole of the foot. Best preserved is the front portion where the original seam at the toe has been retained. From this it is seen that, though taken in slightly in front, the toe is no less than 9 cm. wide.

No. 90.

Hose of very coarse plain weaving (fig. 125, to right) found in the north-west corner of the churchyard. It is uncertain whether it is a "stunt hose" or an ordinary hose with a foot. Only the leg is preserved in its entirety. It is formed of a single piece of material, 45.5 cm. long and 38 cm. wide at the top, 24.5 cm. at the bottom, where it has two unequally long slits (fig. 126, II). The upper edge of the hose is overcast with very large stitches. The lower edge has had another piece attached which is unfortunately incomplete, being torn off in an irregular line in front. It passes in a broad strap under the heel and the hollow of the sole, but has evidently been fastened behind the heel. The most probable assumption is that a real foot has been attached to it.

No. 91.

Hose found in the extreme north-east corner of the churchyard. It is very defective, nevertheless its cut may be determined with certainty (fig. 126, III). It is of brown fourshaft weaving, consisting only of a leg cut in one piece and joined along the back of the limb. It is shaped to the form of the leg and, in contrast to what seems to be the normal type, it is almost symmetrical. At the ankles it has slits abt. 8 cm. long which have no doubt been necessary to get the foot through. In cut it thus corresponds to No. 90 and, as in that article, a foot or at least a strap may have been attached, but hose without feet (gaiters)

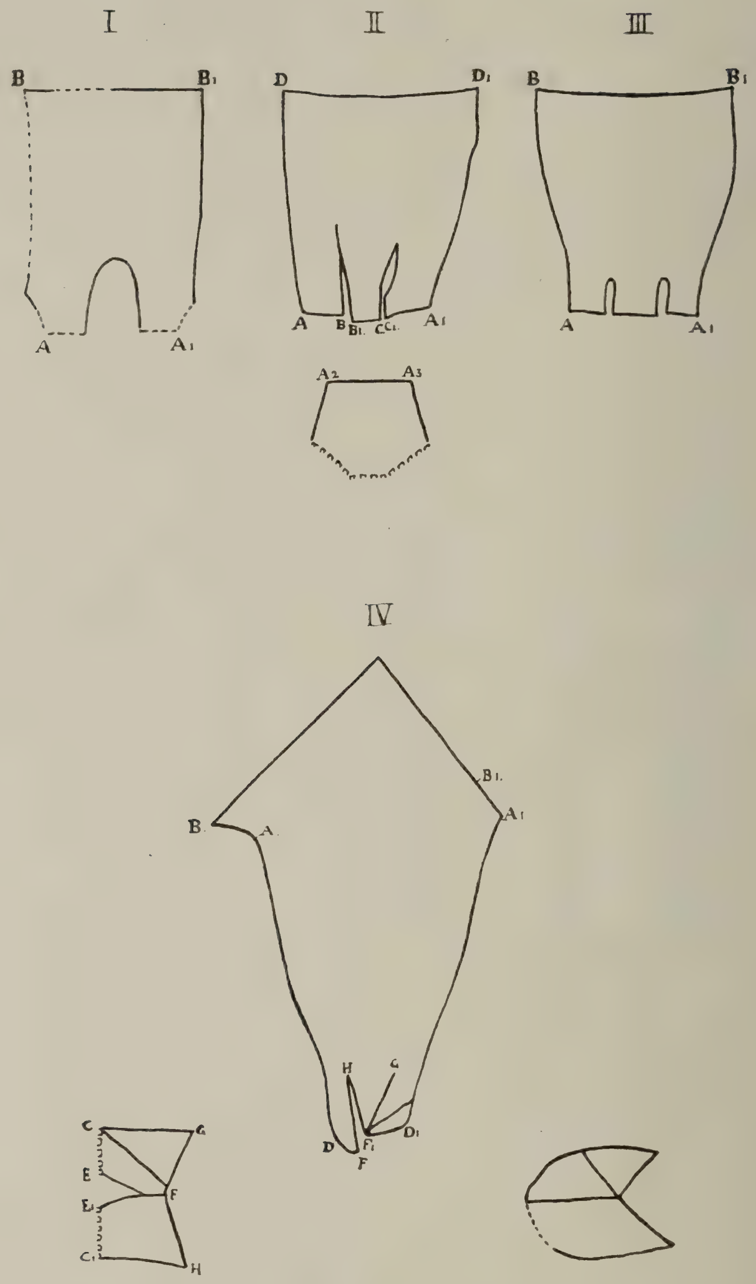


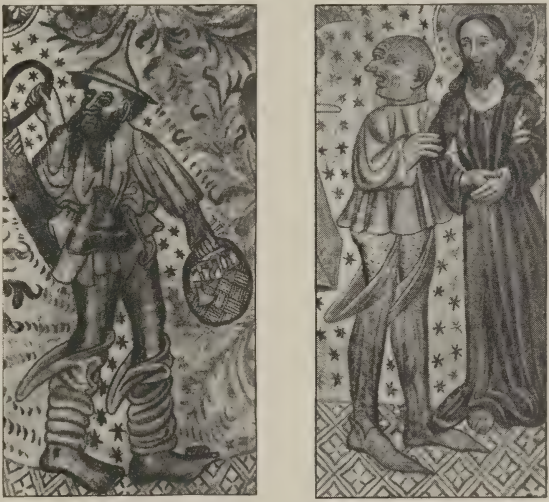
Fig. 126. Diagrams of hose. ($^1/_{15}$).
I No. 93, II No. 90, III No. 91, IV No. 88 (one leg and two feet).

were well known and largely worn in the Middle Ages. Its length is abt. 44 cm., its greatest width 38 cm. which corresponds fairly well with Nos. 90 and 93. It has reached to below the knee and been worn by a normally developed, adult person. A small piece of plaited strap 1.1 cm. broad and 6.5 cm. long but hardly complete has presumably served as a suspender. Where it has been attached is not known; it was found lying loose near the hose.

No. 92.

Hose (?) found in the north-east corner of the churchyard lying beside No. 91 in such a way that there seemed no doubt they were a pair (fig. 125, in centre). On further examination this assumption does not seem tenable since the two pieces proved to be quite different in material, cut, and size.

No. 92 is chiefly formed of a single piece of brown material of coarse, uneven, plain weaving, abt. 70 cm. long and 9 or 9.5 cm. wide. This peculiar, long narrow piece has been sown together lengthwise with a seam both at the front and at the back of the leg. The heel is closed, whilst in front there is a 13 cm. deep opening for the foot.



Figs. 127—128. Figures with long-legged hose (abt. 1440).

Wall-paintings in Kongsted church, Seeland.

In spite of the abnormal feature of the closed heel this, then, should be a "stunt hose" with a strap under the foot instead of a proper foot. This conjecture is corroborated by the fact that the part below the hollow of the sole is much worn. But the complete lack of shape and the slight width are undoubtedly very strange. While the width of the hose otherwise varies from 25 to abt. 38 cm., this one is only from 18 to 19 cm. wide throughout its entire length. It can thus only have been worn by a child. At the top there was an edging of a very much worn piece of material, 4 cm. wide, of fourshaft weaving. The edging included, the length is barely 40 cm., or 10 cm. less than required for the normal knee hose of an adult.

No. 93.

Hose ("stunt hose") very dilapidated. Taken up south-east of the church in a disordered layer beneath hood No. 68, dress No. 35 and hood No. 74. Inside the hose was found a shinbone (Anatomical Section No. XXVI).

The material is fourshaft weaving of a vivid brown colour. The hose is cut in one piece sown together along the back of the leg. It is cut out for the foot and a little less for the heel, the two flaps in which it ends having been joined as a strap under the hollow of the sole (fig. 126, I). In the present defective form of the hose the long sides of the leg are almost parallel and on the straight. Only one of them has retained its original edge, and most likely the other side has been cut on the bias as in other preserved hose, for instance No. 90.

According to its length the hose would fit a normal adult person (the shin-bone indicates a person of 18 years). It has reached to below the knee where it has been tied up.

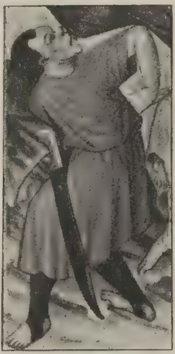


Fig. 129. Figure wearing "stunt hose" (abt. 1435). Detail of the altar-piece from Boeslunde, now in the National Museum, Copenhagen.

The cut used for the hose quite agrees with what we must assume to have been in use in Europe, both in regard to the way in which the foot is joined on to the leg and the apparently very inconvenient method of placing the seams under the foot. But little remains for comparison. We may, however, draw attention to the magnificent gold- embroidered silk buskins (*caligae*) found in the tomb of an archbishop of Canterbury, dating from the beginning of the 13th century[1]).

To the dating or general historical estimate of the find the hose contribute but little. All of the types found might be referred to almost any point of time within the centuries during which the Norse colonies existed, apart from the first century. Throughout the Middle Ages long hose (figs. 127—128), "stunt" hose (fig. 129) and gaiter-hose (fig. 130) were worn in the North,[2]) and that no doubt by both sexes, though women's lower limbs or even feet are seldom displayed in the pictures. The two latter types at any rate in the late Middle Ages, and right down to our own day, belonged almost exclusively to the dress of the common people.

The woven hose did not possess the same elasticity as our knitted hose, and it was thus difficult to make them fit closely round the leg, as of course they had to be so wide at the ankles that they could be pulled on. And indeed, it is very plainly seen in pictures from the Middle

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[1]) By W. H. St. John Hope they are described as follows: the part covering the leg and hinder part of the foot is all in one piece, joined down the back and along the bottom; that covering the forepart of the foot is also in one piece, joined underneath. Vetusta Monumenta VII, part I (1893) where an excellent picture is given. Cp. further Braun: Die liturgische Gewandung, fig. 192 and 199—200.

[2]) Falk, Altwestnordische Kleiderkunde p. 122 seq.

Ages that they usually, especially in the case of the common people, lay in big folds. This defect was remedied by the more foppish by bands wound round the ankles. The hose from Greenland are not distinguished by slenderness of ankle but whether they have had bands wound round them we cannot now decide.

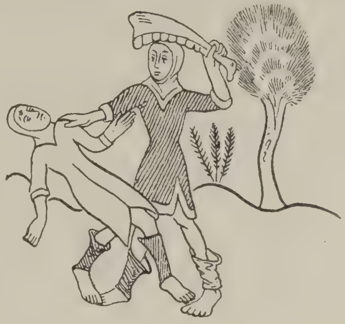
Fig. 130. Cain and Abel wearing gaiter-hose (abt. 1450). Wall-painting in Vallensbæk church, Seeland.

The most interesting specimens are the long hose that covered the entire leg and were fastened to the belt or to the drawers from which they could be undone when hard work demanded freedom of movement. They would then hang in large folds about the legs as characteristically shown in fig. 127.

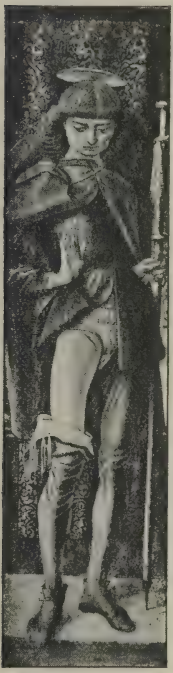
Fig. 131. Carlo Crivelli: St. Roch (abt. 1475). Wallace Collection, London.

The long hose date principally from the period of the long gowns. In the history of the costumal changes there is a continual correspondence between hose, breeches and upper garments. In the early Middle Ages when men wore short gowns, they wore longer or shorter breeches out of regard to decency, while the hose were of less importance and rarely reached above the knees. But as the gowns gradually grew in length the breeches shrunk more and more, and were at last little more than a sort of loin cloth, or, if they were somewhat larger, they lay in big, baggy folds not designed to be seen. In Europe they were mostly linen.

But during this development, in which, briefly, the breeches were reduced to drawers, the hose grew to be the principal article of clothing for the legs, so much so, indeed, that when the quite short jacket came in in the middle of the 14th century, men seemed disinclined to return to breeches. The young men would not give up the long hose, and moralists long railed in vain against the indelicate exposure of the limbs they were forced to witness (cp. figs. 127—128). It was only in the course of the 15th century that breeches again made their way in.[1]

As will be seen from the above, the long hose, which in the given case, No. 88, must be assumed to be male since they were found with a male gown, cannot be older than the 12th century, while, on the other hand they may very well be found throughout the 15th century (fig. 131). No more can, I think, be added on this subject.

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[1] Post, Die franz.-niederl. Männertracht, p. 82.

Accessories to the Costumes.

No. 94.

Leather piece, 27.5 cm. long, 14.5 cm. broad, found in the north-east corner of the churchyard quite close to the wall. It was impossible to determine whether it belonged to any of the costumes found there. The broad end was found lying in large pleats or folds. Inside it lay metatarsal bones of a young individual (Anatomical Section No. VI).

Probably the piece has formed a sort of foot-wear for a small person; a primitive shoe made of a piece of similar shape has been found in Denmark (Nat. Mus. No. 372). But it is a peculiar or even unintelligible fact that no eyelet-holes are found along its edges for laces to fasten it round the foot. Another peculiarity is that, though it is worn through at the heel, the surface of the leather shows only slight marks of wear. A number of small crosses have been cut on it (fig. 132). As several of the crosses are incomplete at the edge they must consequently have been incised before the piece was cut. It is worth noting that these crosses have almost the same shape as those on the small tombstones Nos. 106—107.

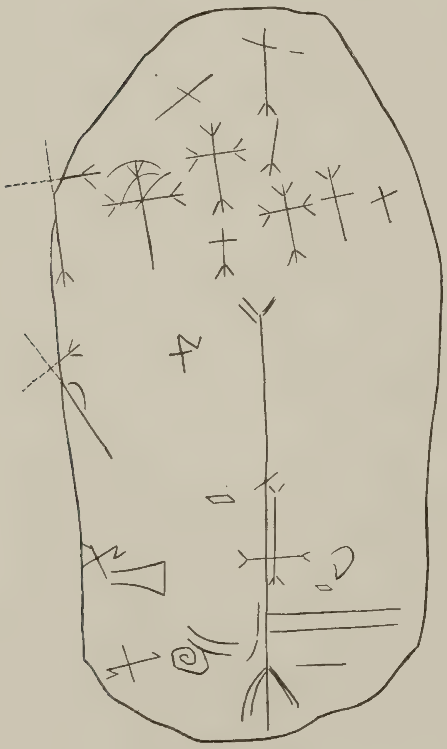

Fig. 132. Crosses incised on the leather piece No. 94. (abt. 1/3).

Samples of Material.

No. 95.

Two small rags of fourshaft twill, the threads very thin and firmly spun, weaving regular. Found in the western part of the churchyard.

No. 96.

Small piece of brown material, of very fine plain weaving (abt. 16 threads per cm., while 10—11 is the normal). It was found west of the church by the left arm of the same corpse to which the two metal brooches No. 100 belong, but may possibly belong to an interment above it.

The entire piece is only abt.

29 × 21 cm. and two of its sides are incomplete, while the other two have the edge turned under. From its shape it may very well have belonged to a sleeve. At one of the incomplete sides a gore of plain-woven but somewhat coarser material has been let into a slit. Along the edge were attached remains of skin, and down, too, was found with it. It is not quite clear what it has been used for.

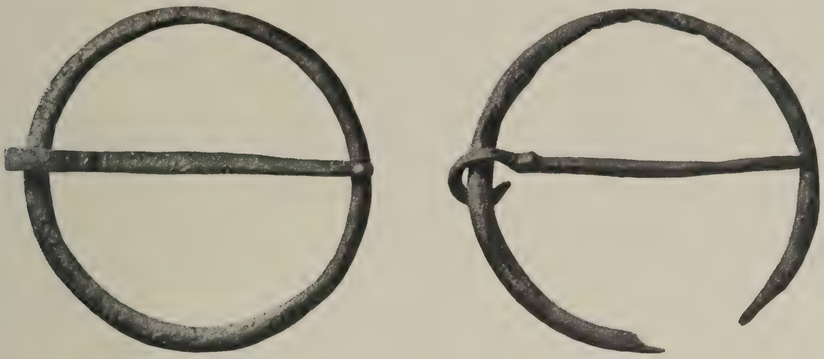

Fig. 133. Two brooches, No. 100. (Nat. size).

Cords.

No. 97.

Wollen cord found at the top end of coffin No. 19, 1.12 m. long. Formed of a great number of threads of unequal thickness, simply twisted together and tied at the ends.

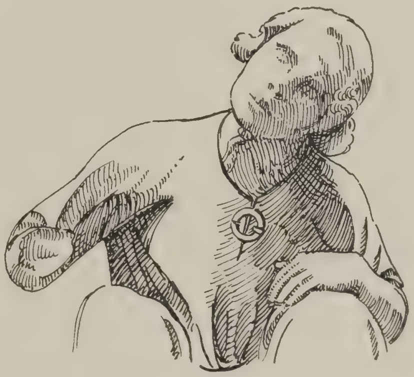

Fig. 134. Figure from the south transept of the cathedral of Reims (13th cent.).
The breast slit closed with a brooch.

No. 98.

Woollen cord found with the remains of the skin of a polar bear (comp. above p. 87), the arm of a cross (No. 127) etc. 22.5 cm. long. It is neither twisted nor plaited but formed of felt lying as a tube round a nucleus of plant substances.

No. 99.

Four pieces of thick cord, simply plaited of 3 × 3 spun threads. The smallest piece was found with dress No. 52. The others, two of which have knots, were found close by, south-east of the church.

No. 100.

Two brooches of brass formed of a thin circular ring with a thorn attached (fig. 133). Diameter 4.8 cm. They were found with an interment west of the church at a depth of 116 cm. below the present surface lying beside one another at a distance of 10 cm. They were found at the place of the belt, but judging by their shape they are not actual buckles. Both the body and its shroud were almost entirely dissolved, but when the earth was scraped the bones were distinctly visible outlined against it, and it could be seen that the arms had lain across the abdomen. The finely woven piece of material No. 96 may possibly belong here (comp. p. 190). By their shape the brooches seem to date from the 13th century.

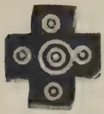

Fig. 135. Pendent cross of bone. (Nat. size).

No. 101.

Small cross of bone 13 by 13 mm. and 4 mm. thick with small rings engraved on the front (fig. 135); in one limb a hole had been pierced by which to suspend it. Small as it is, it is undoubtedly an ornament for the neck, and possibly from a very early period. The simple ornamentation with the carved circular rings is at any rate most frequent in the Romanesque period.

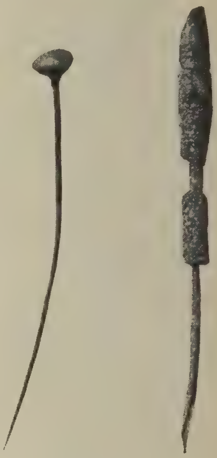

Fig. 136. Two pins of copper. (Nat. size)

The cross was found at the water's edge by the churchyard by Eskimos and presented to the National Museum by Mr. O. HASTRUP, superintendent at Julianehaab.

No. 102.

Two pins of copper (fig. 136) one of them 5.5 cm. long, quite thin and pointed with a round head of a diameter of 6 mm., no doubt hollow. The other is incomplete. They were found with an interment in the middle of the nave of the church together with a bear's tooth and a pointed wooden stick (above p. 68). Of the body itself or its shroud there were no remains.

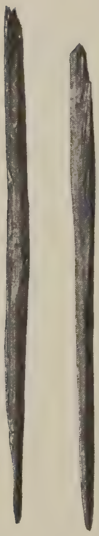

Fig. 137. Wooden sticks.

No. 103.

Pointed wooden sticks (fig. 137), eight in all, no doubt employed for fastening the shroud, similarly to what is known from the Danish oak-coffin finds from the Bronze Age. The longest is 16.7 cm., the shortest 9 cm. Found in different interments partly inside the church (cp. No. 102), partly in the north-western corner of the churchyard, but in no case was the shroud preserved.

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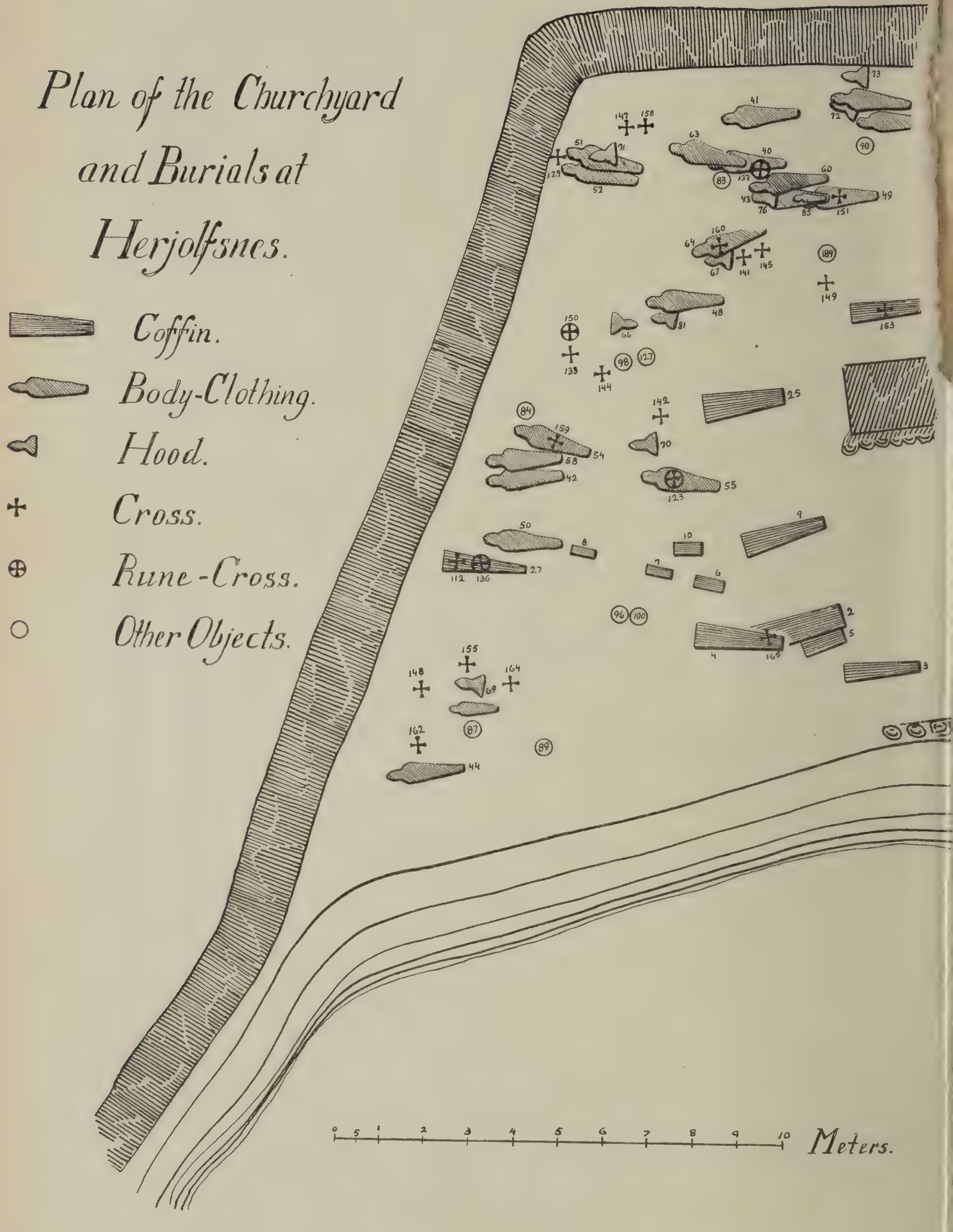
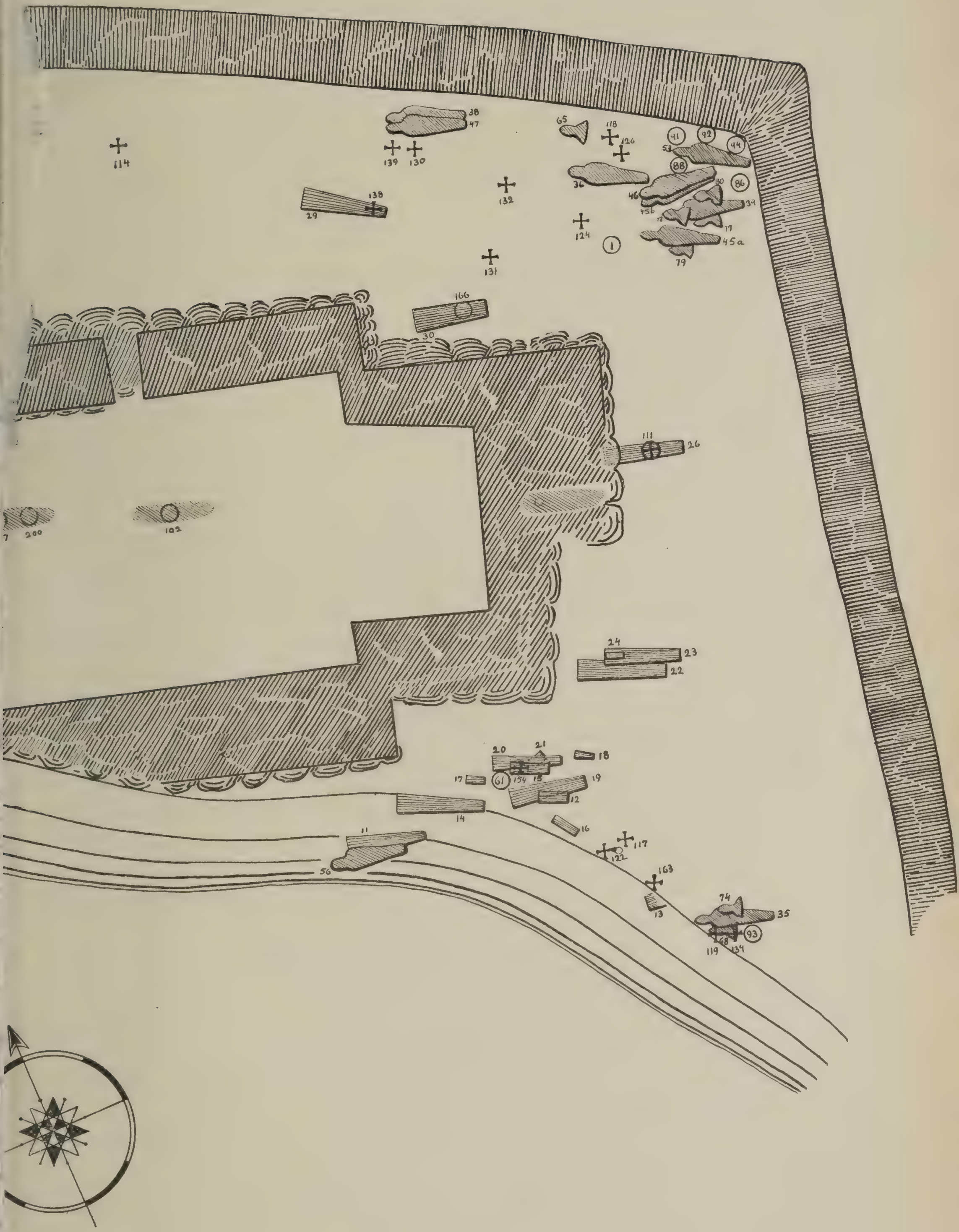


Plan of the Churchyard and Burials at Herjolfsnes.



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Chapter VII.

Tombstones.

No. 104 †.

Tombstone of granite (fig. 138), found in 1830 by missionary DE FRIES from Frederiksdal on a visit to Ikigait which was then inhabited. It was used as a lintel for the door of an Eskimo hut. This was the first find that drew attention to the site of the old churchyard.

The lower portion of the stone is wanting, otherwise it is well preserved. Measuring along the two axes of the cross cut in it, which approximately gives its greatest height and breadth, it is found to be 114 by 48 cm. At the top it is 32 cm. broad, and here it attains its greatest thickness, viz. 14 cm. In shape it is oblong but irregular, the backside being roughly hewn while the front is fairly smooth, least at the top where an elliptic figure is carved in outline.

The main portion of the stone is covered with a Latin cross the arms of which are narrowest at the intersection and expand towards the ends[1]). The cross is surrounded by two arcs meeting at the top and bottom and intersecting the extremities of the transverse limbs.

The main inscription is distributed in two vertical lines on each side of the lower limb, both descending from top to bottom. The letters are majuscules of a somewhat home-made shape but very distinct:—

HER HUILIR:HRO(AR)
KOLGRIMS:S(ON)

i. e. Here rests Hroar Kolgrimsson.

The lower letters of each line are wanting, but there can be no great doubt as to how they should read. In the Christian name the upstroke for the fourth letter, the A, is preserved, so that any name but Hroar or perhaps Hroaldr is out of the question.

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[1]) A cross of the same shape is found on a tombstone from Frodebø on the Faroe Isles (now in the National Museum in Copenhagen).

More enigmatical are some majuscules carved on the top righthand side of the stone along the arc between the upper limb and the transverse limb. The four letters I D V S are plainly to be read, but three others seem to have preceded them, which have hitherto not been interpretable. Involuntarily one is led to think of Latin dating or an indication of the *anniversarium* or death day of the departed which is often mentioned on tombstones, and which it was of importance to know on account of the masses to be said for the dead; but there is not the slightest trace of the name of any month after "idus".

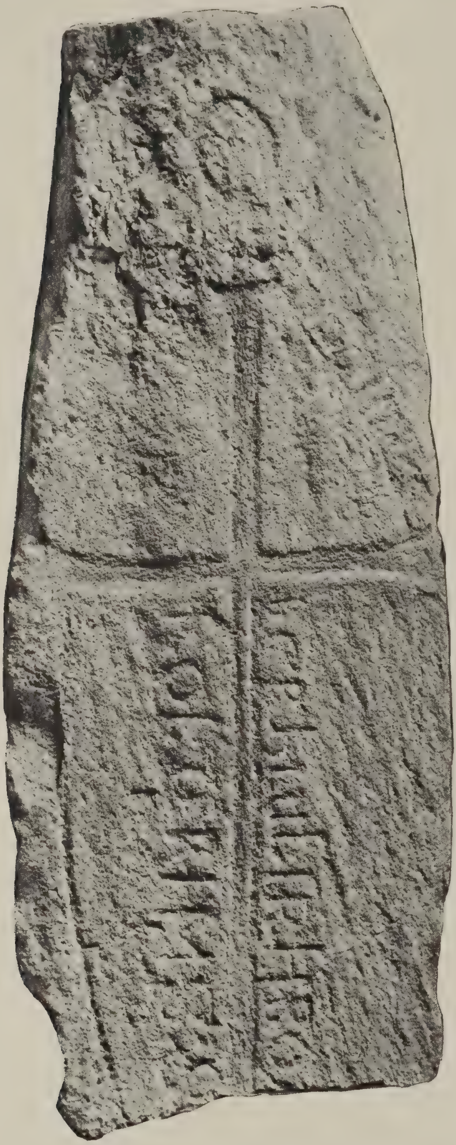

Fig. 138. The tombstone of Hroar Kolgrimsson.

No. 105 †.

Fragments of a tombstone of granite, six pieces in all, five of which were found by Kielsen during his excavations in the churchyard in 1839 and 1840 (Nos. 5682 and 5834 in the National Museum) while the sixth came to light later. It came into the possession of Mr. Rosenstand, Kielsen's successor as superintendent at Nanortalik, and by his widow it was presented to the National Museum in 1886 (D 2166). As will be seen from the picture, fig. 139, where the preserved portions have been shaded, it is only a small part of the stone that is left, but enough for us to reconstruct the upper portion of the decoration with certainty. As regards its lower part and the length of the stone itself we must, on the other hand, remain uncertain.

In contrast to the other tombstones, this stone is regularly shaped, trapeziform, and having a level surface on which both inscription and decoration are rather superficially carved. Most probably it has only been abt. 1.25 m. long. At the top it is 35 cm. broad and its thickness is there 5 cm., while in the lower portion it is only 4 cm. A Latin cross extends over the whole of the stone. It has a double outline. A single borderline runs along all four sides of the stone, cutting off the expanded ends of the limbs, and finally oblique lines cut off the two upper corners. The inscription is not placed outside the border lines, but in the fields adjoining the body of the cross. It is written in majuscules of a type belonging in Scandinavia to the 13th century. The E is round and closed with a straight stroke, the other characters being also of late Romanesque form. A colon is used to separate words. There is not enough left of the inscription for a reconstruction beyond the one word (hj)alpe.[1] This shows, however, that the inscription was in Icelandic.

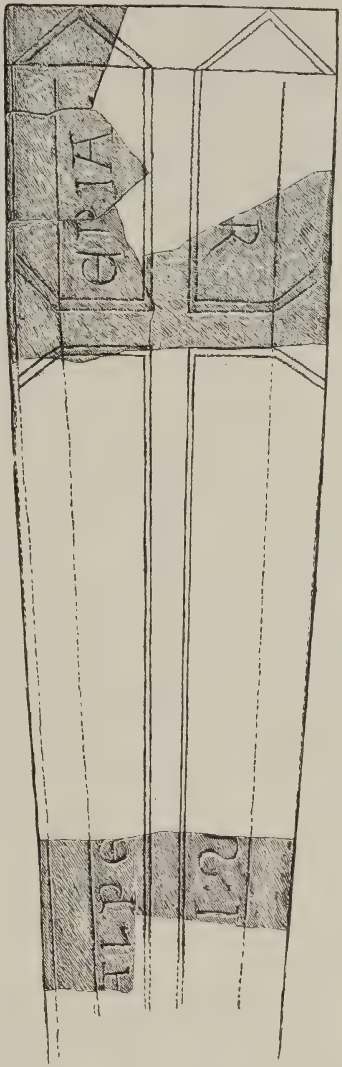

Fig. 139. Tombstone of granite.
Only the shaded parts are preserved.

. . R . . . . N : I . . .
. . ALPE . . . . EP : IA

No. 106—107 †.

While the two preceding tombstones are undoubtedly common recumbent slabs, this is not the case with the two small cross-marked stones found in the churchyard by Kielsen in 1840 (fig. 140).

One is 44.3 cm. in height, 22.5 cm. broad, and 8 cm. thick, the other 38 cm. in height, 25 cm. broad, and 8 cm. thick. In shape they are quite irregular, and are only roughly hewn on part of one side where a cross is carved having triangular terminations and a small spike at the bottom. One of them has besides two small tendrils along the lower limb of the cross. There is no inscription.

Considering the fact that these crosses are carved on the upper part of the surface of the stone, it is certainly most probable that the stones

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[1] Cfr. runic cross No. VII Jesus Kristr hialpi.

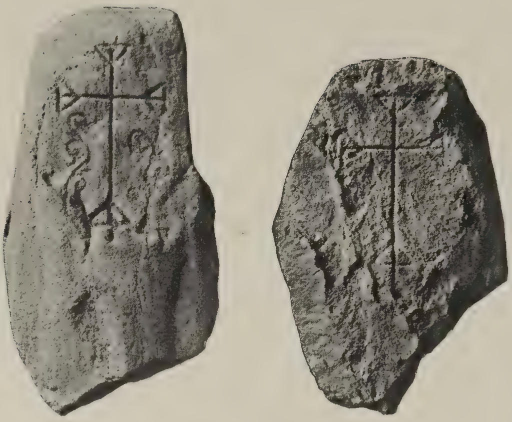

Fig. 140. Two small headstones.

have been in an upright position, their bases buried in the ground.

The simple yet characteristic shape of cross in which each limb consists only of a single line with triangular terminations was from ancient times a favourite type in the British Isles[1]) whence the prototype is no doubt derived either directly or indirectly. On this basis we cannot, however, assign any date to the stones from Greenland. The small tendrils on one of them presumably show that like the above-mentioned inscriptions they cannot antedate the 13th century.

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[1]) Proceed. Soc. Ant. Scotland 1918—19 p. 195, 1910—11 p. 53, 1900—01 p. 80 Sussex Archæol. Collect. 38, 44 (1892).

Chapter VIII. The Wooden Crosses.

Introduction.

The greatest and most interesting part of the grave furniture is the little carved crosses which were laid on the breast of the dead. In chapter V we saw that in this the Greenlanders followed a widespread custom which must apparently have been commonly adopted throughout Europe but which has hitherto only been discovered in a few countries and within rather limited periods. We shall now deal with the crosses themselves and their shapes, describing each specimen and grouping them like the costumes not according to the places they were found, but according to their type. After this will follow some remarks on forms calling for special mention.

Only a few introductory remarks are necessary before we proceed to the special descriptions. A striking feature of this large collection of crosses[1]) comprising 58 specimens in conjunction with those previously exhumed, is their great difference in quality. The greater part, it is true, is very simple and without interest as regards the form, there are, however, some among them which afford us real enjoyment. They are above all distinguished by clever workmanship, even difficult cuts are accurate and sharp, they are accurately assembled, the surfaces are carefully smoothed, sometimes all but polished. But the shape itself is often equally admirable. It is always very simple, we never meet with any profuse ornamentation as we so often find it lavishly employed to the detriment of good taste in similar home industries. Their forte, on the contrary, is a tasteful, one might almost say distinguished, restraint, a feeling for pure lines and just proportions. Also the runes with which several of the crosses are furnished, are of very superior workmanship, clear and accurate, whether they are carved with a knife or traced with a needle.

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[1]) They are all made of wood and predominantly of deal. One limb of No. 150 was however found to be of juniper.

On the other hand there are some among the crosses that conquer our indifference by their infinite simplicity, a couple of peeled sticks, or in one case even two simple chips, one inserted in the other without further shaping, to form the sacred sign of the cross that was to accompany the dead in the grave. When involuntarily we feel touched on looking at these the most primitive of all relics of the past, it is in no small degree due to the wonderful fact that anything so insignificant and perishable should have been able to survive in the earth during half a millennium or more. On the whole we may say about the crosses, more justly even than about the other objects of the find, that their state of preservation is excellent, many of them are so completely undamaged and faultless that we can hardly credit their great age.

The greater part of the crosses consist of two pieces laid across and joined by means of notches fitting into each other and one or several nails at the intersection. All the crosses belonging to this type are mentioned first in the succeeding description and grouped according to their form and ornamentation in: those having a rectangular outline and no ornamentation, those having the extremities of the arms and summit obliquely cut off, those having transverse grooves at the rectangular terminations, those having semicircular hollows at the intersections, and finally those with more developed terminations, fanshaped or expanded, circular or semicircular (with a spikelike peg at the bottom). Further there are transition forms rendering a strictly consistent grouping difficult.

After these follow the few specimens of another type. In some very primitive crosses the vertical limb has been split in its upper part and the transverse limb inserted in the slit. Finally there is one single cross cut out of one piece of wood (No. 162). This was the first to be found in 1921.

Descriptive Part.

A. Crosses having a rectangular Outline and no Ornamentation.

No. 108 †.

Wooden cross found by Kielsen during his excavations in the churchyard in 1839. — 13.5 by 8.7 cm.

The two limbs are joined by means of notches and a single nail. They are straight and smooth and rectangular in transverse section. The cross has no peg.

No. 109 †.

Wooden cross found by Kielsen in 1839 (cfr. No. 108). Length 20 cm.; original breadth barely 11 cm. but one of the transverse limbs is missing.

The limbs are fitted into each other by means of notches and joined with a nail. They are straight and rectangular in transverse section. The lower limb terminates in a broken peg.

No. 110 †.

Wooden cross, found by Eskimos and acquired by Commodore G. Holm during his visit to Ikigait in 1880 (MoGr. VI p. 143). — 13.7 by 11.2 cm.

It is quite rudely shaped of two split sticks with rounded surface. The vertical limb has a notch for the transverse limb, but no nail. The terminations are obliquely cut off, the lower one pointed with a single cut.

No. 111.

Wooden cross found in coffin No. 26 east of the chancel gable (above p. 78 ff.). — 13.7 by 16.2 cm.

Joined by means of notches and five treenails of which only one has been preserved. The members are smooth and rectangular in outline. The lower limb terminates in a peg 14.5 cm. long which does not taper as usual but even expands a little towards the end.

No. 112.

Wooden cross found in coffin No. 27 west of the church, quite near the top end of the coffin (above p. 81). — 36.8 by 14 cm.

The two limbs are joined by means of notches and a single nail and are simply rectangular in outline. The cross is rudely shaped and the lower limb terminates in a long peg.

No. 113.

Wooden cross, 37.8 by 15.4 cm.

The two members are joined by means of a notch in the vertical limb and a treenail with a round head. The vertical limb has canted edges at the back. Four runes are carved on the front (Runological Section No. IV and Fig. 6). It terminates in a peg 20.2 cm. long.

No. 114.

Wooden cross with blackish surface, found north of the church at a depth of 90 cm. below the old surface. — 36.5 by 24.8 cm.

The two members are joined with notches and a single nail. They are straight and smooth and rectangular in section. The lower limb terminates in an almost 10 cm. long peg which is obtuse at the end and may perhaps have been longer.

No. 115 †.

Wooden cross sent to the National Museum in 1852 by Governor C. P. Holbøll, by whom it was stated to have been found at Ikigait (Herjolfsnes) "in a decayed coffin containing human bones." — 20.9 by 11.6 cm.

The two members fit into each other by notches and are fastened by a single tree-nail. They are plain and both the terminations and the intersection are simply rectangular. The lower limb terminates in a peg 6 cm. long. On the left transverse limb is carved the name of the Holy Virgin in runes (Runological Section pag. 273 and Fig. 1; comp. C. C. Rafn: Cabinet d'antiquités américaines (1858) p. 20).

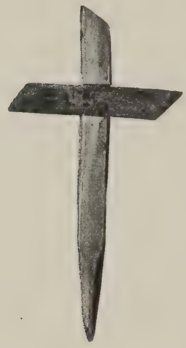

Fig. 141. Cross No. 118 (1/4).

No. 116.

Wooden cross found north of the church at a depth of about 1.20 m. below the old surface, far below the present thaw limit. — 29.5 by 13.8 cm. (the lower part of the vertical limb is missing).

The two members are joined by notches and a single nail. They are both simply rectangular without ornamentation, but on the vertical limb is a runic inscription running from the bottom to the top of which only the last three runes are placed above the transverse limb (see the Runological Section No. II and Fig. 4). The lower limb terminates in a tapering peg, only partly preserved.

No. 117.

Wooden cross found south of the chancel at a depth of 1.04 m. below the old surface on the top of some quite decayed remains of a shroud. — 29 by 9.1 cm. (fig. 144).

The members are joined by notches and a single nail. The transverse limb is conspicuously short. The two arms and the summit have slightly concave sides and the ends cut off straight. Both on the right arm and the lower limb, which terminates in a peg almost 14 cm. long, a small cross is carved.

B. The Extremities of the Arms and Summit are cut off obliquely.

No. 118.

Wooden cross found north of the chancel at a depth of abt. 80 cm. below the old surface. — 17.5 by 9.2 cm. (fig. 141).

The two members are joined by notches and a single nail. The extremities of the arms and the summit are cut off obliquely and the lower limb is pointed at the extremity; all the edges of the front are canted. The little cross is in excellent preservation and in all its simplicity finely executed with smoothly polished surfaces.

No. 119.

Transverse limb of a wooden cross found in overturned burial-layers under hoods Nos. 68 and 74 and dress No. 35, south-east of the church. Length 10.5 cm. Extremities of limbs obliquely cut off.

No. 120.

Stem of a cross, length 20 cm., with notch for transverse limb and the summit obliquely cut off. The lower part tapering to a point.

C. Crosses having a rectangular Outline and transverse Grooves at the Extremities.

No. 121 †.

The vertical limb of a large wooden cross found by Dr. Rink at Herjolfsnes churchyard and sent to the "Cabinet of American Antiquities" at Copenhagen (now in the National Museum). — 27.2 cm. by 4 cm.

It has a notch and in this a nail-hole for the transverse limb. At the extremities of the limbs are three transverse grooves. At the bottom there is a long flat peg in which has been pierced a nail-hole for fastening the cross to a staff or the like.

No. 122.

Large wooden cross, the largest in the find, found in separate parts in the slope south of the chancel at a depth of abt. 115 cm. below the old surface. — 69 by 28.7 cm. (fig. 142).

The vertical limb consists of two pieces joined by a scarf-joint and five treenails immediately below the transverse limb. The two arms fit into each other by notches and are likewise kept together by five nails. At the extremities of the three upper limbs are two transverse grooves. The lower limb is smooth and terminates in a peg 39.5 cm. long.

No. 123.

Wooden cross found west of the church at a depth of abt. 75 cm. below the old surface with an entirely decayed interment which lay underneath the badly preserved shroud No. 55. — 29.4 by 14.2 cm.

The two arms fit into each other by notches and are held together by a single tree-nail with a rounded head. Both arms are covered with very accurately carved runes (Runological Section No. VI and fig. 7). At the extremities there are besides three transverse grooves, the outermost one being the broadest. The lower limb terminates in a peg 13.4 cm. long. The surface of the cross which is smoothed and may perhaps have been painted is unfortunately somewhat chipped so that the runes, too, have been damaged.

No. 124.

Wooden cross, small and slender, found north of the chancel at a depth of abt. 90 cm. below the old surface. — 15 by 7.1 cm. (fig. 143).

The two limbs are joined by means of notches and a single tree-nail. Transverse grooves at the terminations, three on the summit and the right arm, four on the two other limbs. The lower limb terminates in a peg. Like the limb itself it is flat at the top where it has two transverse grooves, while the extremity is round and pointed.

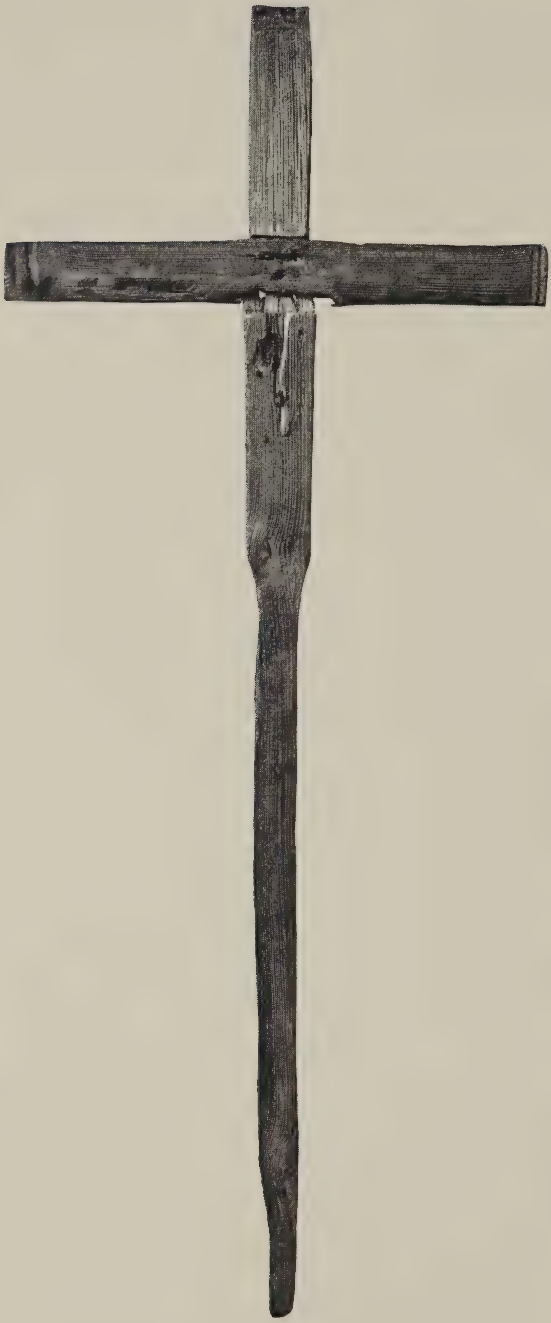

Fig. 142. The largest of the crosses, No. 122 ($^1/_4$).

No. 125.

Wooden cross found north of the church at a depth of abt. 1.10 m. below the old surface. In excellent preservation. — 21.5 by 10.2 cm. (fig. 148, to right).

The two arms are fitted into each other by means of notches and kept together by a single nail without a head.

At the intersection is carved a St. Andrew's cross. At the extremities there are four transverse grooves. On the lower limb they are twice the distance from the intersection that they are on the others, and below them is a peg 7.5 cm. long tapering regularly to a point.

No. 126.

Upper limb of a wooden cross found north of the chancel in overturned layers with a little of the notch and nail-hole for the transverse limb preserved. Length to the notch 8.1 cm. At the extremity five narrow transverse grooves.

No. 127.

Half of the horizontal limb of a wooden cross found in the western part of the churchyard at a depth of abt. 90 cm. below the old surface together with a strip of leather 11 cm. long and 1.2 cm. broad, a piece of woollen cord (No. 98 above) and a lump of brown polar-bear hair, probably the remains of a hide.

Length to the notch for the vertical limb 8.4 cm. Three transverse grooves at the extremity.

No. 128.

Chip of the limb of a cross with three transverse grooves.

Of a somewhat richer ornamentation are the following:

No. 129.

Wooden cross found in the north-western corner of the churchyard at a depth of abt. 75 cm. below the old surface, under hood No. 71. — 24 by 10.1 cm. (fig. 143).

The two limbs are joined in the usual way by means of notches and a single nail without a head. The limbs have mostly canted edges, besides three transverse grooves both at the extremities and near the intersection. The lower limb terminates in a peg 11.2 cm. long. The transverse limb has canted edges at the back and two fine transverse grooves at one end.

No. 130.

Fragment of a wooden cross exhumed north of the church in overturned layers.

The horizontal limb (11.7 cm. long) and a piece of the vertical limb are preserved. They are joined in the usual way by notches and a nail.

Each limb is ornamented with three transverse grooves at the extremity and four at the intersection.

No. 131.

Wooden cross found north of the chancel at a depth of abt. 85 cm. below the old surface. It is of good and careful workmanship and in excellent preservation. — 26.6 by 14.5 cm. (fig. 143).

The two limbs are joined in the usual way though without a nail. The edges are slightly canted and at each extremity there are broad cuts forming a transverse round with a small fine groove. The lower limb terminates in a peg 9.3 cm. long.

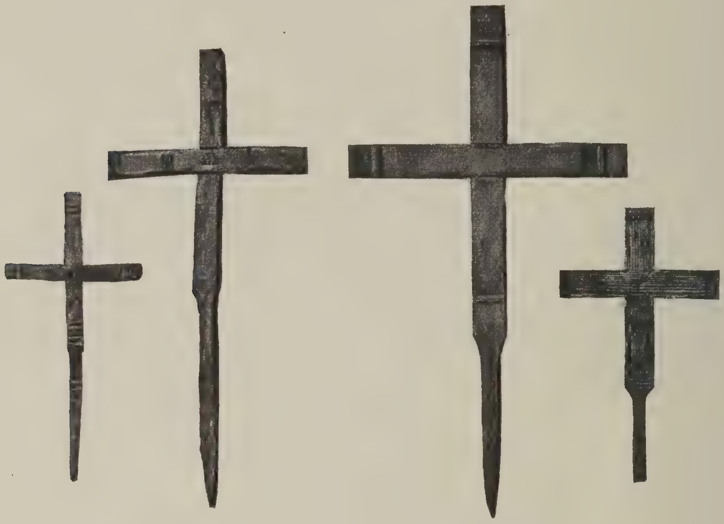

Fig. 143. Four crosses Nos. 124, 129, 131, and 133 ($^1/_4$).

No. 132.

Wooden cross found north of the chancel at a depth of abt. 1 m. below the old surface, the carved side lying downwards. — 24.5 by 13.6 cm. (fig. 146, to left).

Joined by means of notches and a tree-nail without a head. Along the edges of the limbs is carved a strongly marked groove and at all the extremities three transverse grooves of similar cut. The lower limb terminates in a tapering peg 10 cm. long.

No. 133.

Small wooden cross found in the western part of the churchyard at a depth of abt. 90 cm. below the old surface. — 14.2 by 8.3 cm. (fig. 143).

Joined in the usual way by means of notches and with a single nail without a head. Along the edges of the limbs runs a groove like that described in the preceding piece, and at the extremities three transverse grooves. The lower limb terminates in a peg 5.8 cm. long having a broad, flat termination.

No. 134.

Wooden cross found with an interment south-east of the church under hood No. 68 which was covered by Nos. 35 and 74. — 19 by 10 cm. (fig. 148, to left).

Joined by means of notches but without a nail. Grooves along the outlines, and at the extremities of the upper limbs a transverse round.

The lower limb is somewhat different. It decreases gradually in width and thickness, but does not terminate in the usual peg but in a small die ornamented with a chequered pattern carved on the front.

To the same group we refer:

No. 135.

Wooden cross found north of the church with an almost entirely decomposed body at a depth of 80 cm. below the old surface. The carved side lay downwards. — 36.5 by 18.5 cm. (fig. 144, to right).

The two parts of the cross are joined by means of notches and a single nail with a round head. All four limbs have concave sides while the extremities are straight and ornamented with three transverse grooves. The lower limb terminates in a round peg 12 cm. long.

D. Crosses having Semicircular or Segmental Hollows at the Intersections.

No. 136.

Wooden cross found on the lid of coffin No. 27 (above p. 81). — 36 by 15.3 cm.

The two limbs are joined in the usual way by means of notches and a single tree-nail with a large round head. The cross has semicircular hollows at the intersection but does not otherwise show careful shaping. The upper extremities are rectangular, the lower limb passes regularly into a roughly pointed peg 21 cm. long. The most interesting feature of the cross is the runic inscription carved very plainly both on the vertical and the transverse limbs. See Runological Section No. III and Fig. 5.

No. 137.

Large, heavy cross of which one transverse limb and the point of the lower limb are missing. Found in the north-western corner of the churchyard among disturbed skeletal remains under .dress No. 40 to which belongs the cap No. 83 and which again was covered by No. 63. — Present length 38 cm. Original width 26 cm.

The two arms are joined in the usual way by means of a notch and a single nail, the extremity of the summit is ornamented with a round, while the transverse limb is plain. Semicircular hollows at the intersections. Lightly carved runes on both limbs. See Runological Section No. VII and fig. 8.

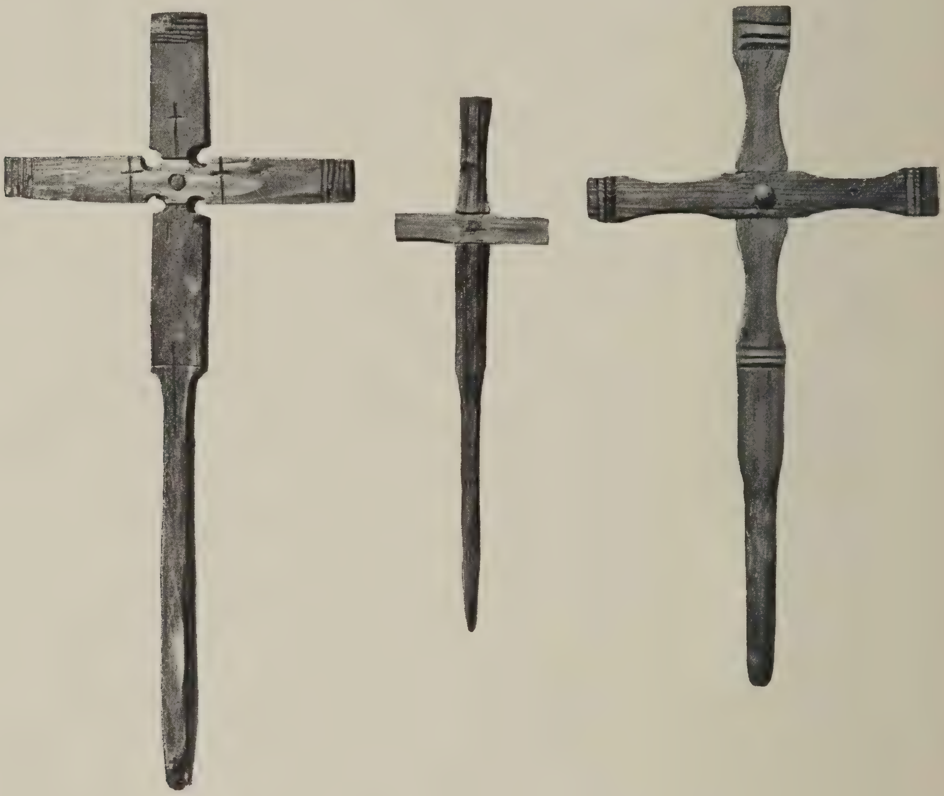

Fig. 144. Crosses Nos. 138, 117, and 135 (1/4).

No. 138.

Wooden cross found north of the church in coffin 29 at the foot-end. — 41.5 by 18.2 cm. (fig. 144, to left).

The two arms are joined by means of notches and a nail. The extremities are rectangular with respectively four, five, and six very irregular transverse grooves. At the intersection there are semicircular hollows one of which is outlined with a groove. On each arm a small cross has been carved or pricked in nearest the intersection. In addition, a similar cross is carved on the lower limb where it passes into the peg (22.5 cm. long).

No. 139.

Wooden cross found north of the church at a depth of 80 cm. below the old surface. — 33.6 by 20.5 cm. (fig. 145, to left).

The two members are joined by means of notches and five nails. The limbs are rectangular in outline, only the summit is slightly expanded. At the extremities there are two transverse grooves and at the intersection hollowed angles outlined with grooves. The lower limb terminates in a peg 9 cm. long.

No. 140 †.

Wooden cross, presented to the National Museum in 1910 by district physician R. Bentzen, Julianehaab (MoGr. XLVII p. 356, fig. 42). — 18 by 14 cm. (lower limb incomplete).

The two members are joined by means of a notch and one nail. At the extremities there are three grooves, and at the intersection hollowed angles marked off by small projecting knobs. The limbs expand slightly towards the ends. A peculiarity of this cross is that the horizontal limb is undoubtedly derived from an earlier cross to which a new vertical limb has then been supplied. The transverse member is far better and more regularly shaped, the fresh piece has not been properly fitted into it, particularly at the notches.

No. 141.

Wooden cross found in the north western corner of the churchyard at a depth of 90—100 cm. below the old surface, covered by three more recent interments, cross No. 145, hood No. 67, and at the top, dress No. 64 with cross No. 160. — 27 by 15.1 cm. (cp. fig. 42, lower right-hand corner).

The two limbs are joined by means of notches and one nail. The upper limb has only been preserved in half its width. Smooth rectangular extremities, and hollowed angles at the intersection outlined with grooves. The lower limb terminates in a peg 11 cm. long and rather broad.

No. 142.

Wooden cross found west of the church at a depth of abt. 80 cm. below the old surface. — 23 by 15 cm. (fig. 145, centre).

The two limbs are joined in the usual way. The extremities are smooth and rectangular. At the intersection hollowed angles outlined with narrow grooves. The lower limb terminates in a slightly crooked peg 9 cm. long. The surface of this rather rude cross is black as if it had been painted.

No. 143 †.

Wooden cross found by Mylius Erichsen, the author, in a digging at Herjolfsnes in August 1904. It lay on the top of a board supposed to be the lid of a coffin but at any rate belonging to a coffin. — 32.5 by 16.5 cm. (fig. 145, to right).

The two limbs are joined by means of notches and a single nail with a round head. The rectangular extremities have two transverse grooves while there are broad round hollows at the intersection outlined with grooves connected by transverse strokes so as to form a cross with limbs of equal length. On the lower limb above the 15 cm. long peg four long runes, m-a-i-a, have been inscribed with a needle, a misscript most likely for Maria (Runological Section fig. 2).

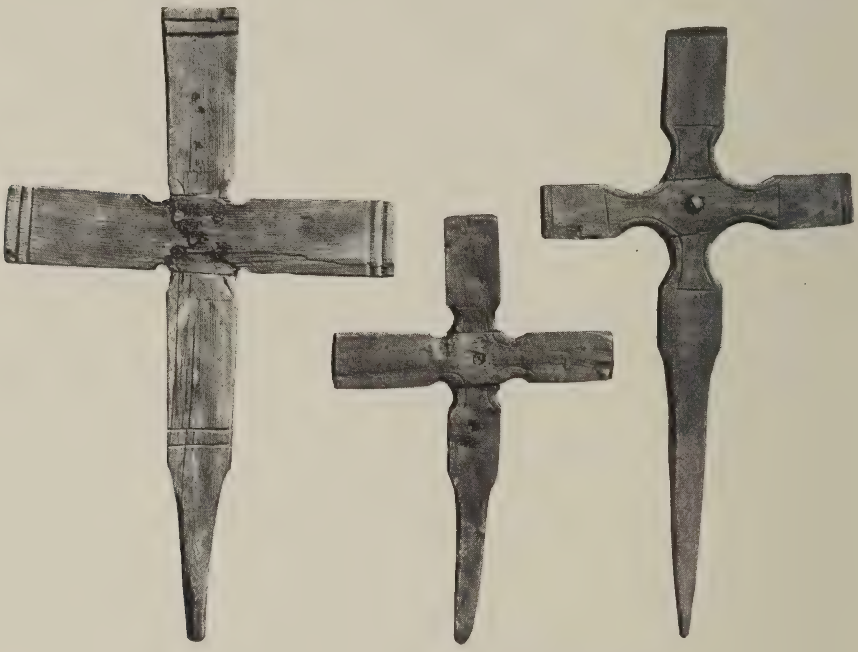

Fig. 145. Crosses Nos. 139, 142, and 143 (1/4).

No. 144.

Wooden cross found west of the church at barely 1 metre's depth below the old surface. One of the most finely executed and best preserved pieces. — 25.2 by 14.7 cm. (fig. 146, to right).

The two limbs are joined in the usual way, the extremities are smooth and rectangular. At the intersection there are broad open semicircular hollows bordered on the outside by transverse mouldings. The lower limb terminates in a peg 8.5 cm. long.

No. 145.

Fragments of a wooden cross found in severed condition in the north-western corner of the churchyard, one piece under hood No. 67 and dress No. 64 with cross No. 160; below it cross No. 141.

It must have been a fairly large and well executed cross. Only the transverse limb is entire. It is 23.4 cm. long. Smooth rectangular extremities. Round open hollows at the intersection bordered by four transverse grooves on the horizontal limbs.

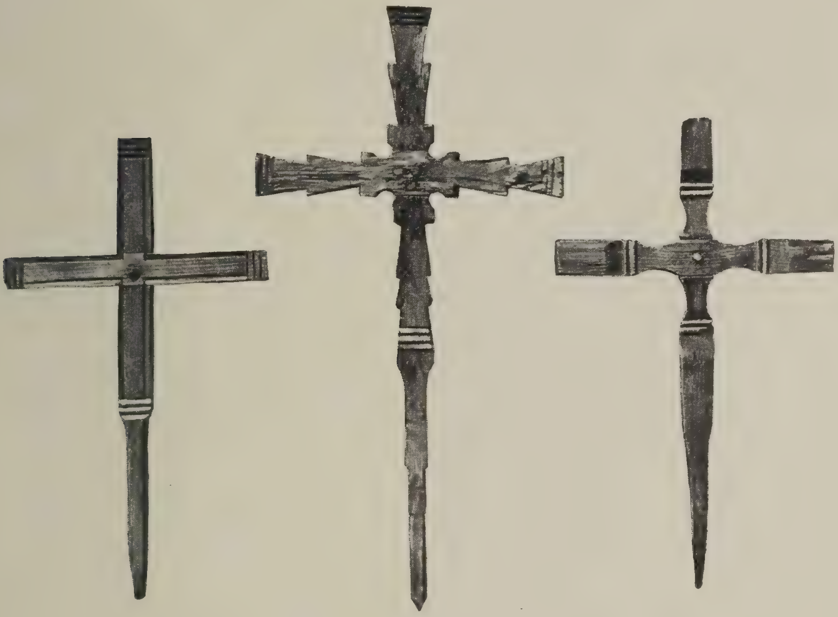

Fig. 146. Crosses Nos. 132, 149, and 144 (1/4).

No. 146.

Limb of a cross 13 cm. long, obliquely cut off at the extremity while at the other end is seen the beginning of a semicircular hollow.

No. 147.

Limb of a cross found in the north-western corner of the churchyard. It is 9.6 cm. long and broken off at the weak point by the intersection which has had open hollows. Slightly expanded towards the end.

No. 148.

Large wooden cross found in the western part of the churchyard, deep down in the frozen earth (abt. 1 m. below the old surface), on the breast of an entirely decayed body. — 49 by 27.4 cm. (fig. 147).

The two limbs are joined by means of notches and a single large tree-nail with a round head round which two circles are incised. There are semicircular hollows at the intersection and similarly in the middle of each limb. The extremities are slightly concave and have one broad and two narrower transverse grooves. On the extremity of the upper limb there is moreover a square key-pattern, and on the (heraldic) right limb a hatched stripe. Following the outline of the limbs and especially at the hollows there are grooves and on the lower limb a Latin cross. The lower limb terminates in a peg 19.5 cm. long.

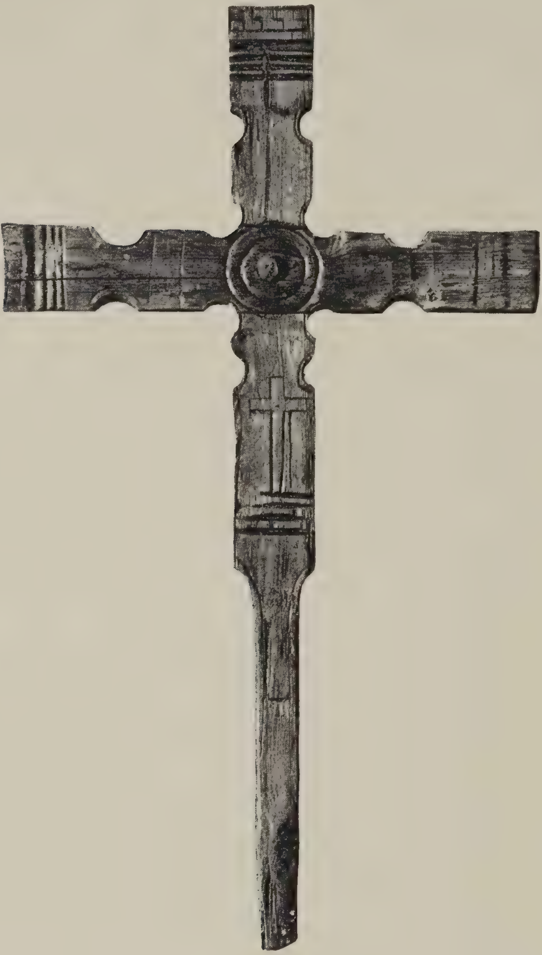

Fig. 147. Cross, No. 148 ($^1/_4$).

No. 149.

Wooden cross found in the north-western corner of the churchyard, at a depth of abt. 85 cm. below the old surface. — 32.6 by 16.1 cm. (fig. 146, centre).

The cross is joined by means of notches and three nails. There are semicircular hollows at the intersection. Oblique incisions give a crenated outline to the limbs. The extremities have each three or four transverse grooves and the lower limb terminates in a peg 13.4 cm. long. Even if the hollowed angles show relationship with the crosses described above, this quaint and ingenious shape is unique among the Greenland crosses, nor have, I think, similar crosses been found elsewhere, unless indeed we compare it to the naturalistic cross-trees with lopped-off branches, a type much in vogue during the early Gothic period.

E. Crosses having Fanshaped or Trapeziform Ends.

No. 150.

Wooden cross found west of the church at a depth of abt. 1 m. below the old surface. This is the most finely executed and best preserved of all the crosses found and, for several reasons, the most interesting. — 24.7 by 15 cm.

The two members are joined by means of notches and a nail with a pointed head. They did not originally belong together and are very differently ornamented. The transverse limb is of the earliest date, it is made of juniper and has fanshaped expanded ends marked off by a grooved transverse round, projecting on the sides. Two strongly marked grooves follow all outlines.

The vertical limb which is made of deal has ornamentation only at the two extremities. The upper end seemingly imitates the transverse limb, but is more Gothic in design. It is formed as a little moulded capital with a flat hollow at the lower edge, below it is a broad, flat band having two transverse grooves. The lower extremity is formed in a similar manner but terminates in a carrot-shaped peg (2.5 cm. long).

Both members of the cross are covered with runic inscriptions, but also these inscriptions, are of entirely different character (see Runological Section No. V and Pl. I).

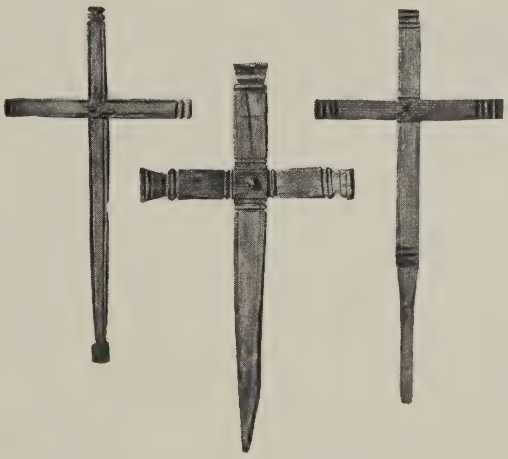

Fig. 148. Crosses Nos. 134, 151, and 125 (1/4).

No. 151.

Wooden cross found in the much decayed dress No. 49 in the western part of the churchyard. Hence it must have been lying on the naked breast of the dead person, curiously enough with the lower end pointing towards the right shoulder. It was covered by several later interments, dress No. 43 and above that again Nos. 60 and 85. — 20.8 by 11.3 cm. (fig. 148, centre).

Joined by means of notches and a tree-nail with a round head. The trapeziform extremities have transverse grooves and are marked off by a grooved round moulding.

Nearest the intersection each limb has a couple of grooves and rounds, and the whole of the vertical limb has finely incised lines along the edges. On the upper portion of this limb is carved an oblique cross of fine lines. Immediately below the intersection it begins to taper.

No. 152 †.

Wooden cross, sent to the American Cabinet at Copenhagen in 1849 by the Rev. F. Westerboe, Julianehaab, who stated that during a strong gale the sea had washed away part of the churchyard, several graves lying unusually close together being thus exposed. In one of them part of the coffin was intact and the skeleton undisturbed, and in its folded hands lay the wooden cross. Comp. C. C. Rafn: Cabinet d'antiquités américaines à Copenhague (1858) p. 20, with an illustration. — 13.3 by 10.9 cm.

The three upper limbs have slanting incisions at the terminations and at the extreme ends a small transverse groove. Only a chipped bit of the lower limb has been preserved. The limbs are joined in the usual way with notches and a single nail.

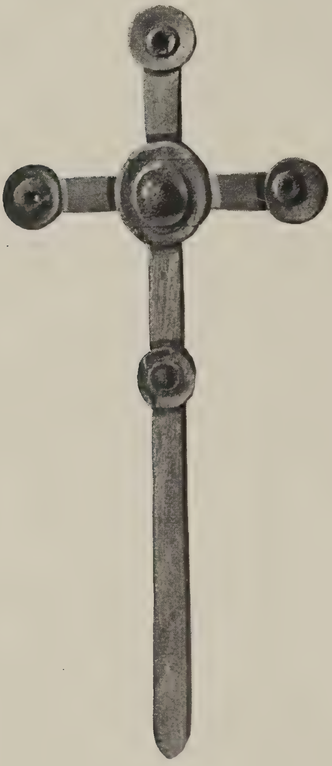

Fig. 149. Cross No. 153 (1/2).

F. Crosses having Circular Ends.

No. 153.

Small wooden cross found in coffin No. 28, finely shaped and in excellent preservation. — 20 by 8.4 cm. (fig. 149).

It is joined in the usual way, but differs entirely from the other crosses in shape and ornamentation. The junction of the limbs forms a circular disc in the centre of which is a nail with a high pointed head. At the extremities too are circular fields, having a pierced button in the centre. In the lower limb the hole is filled with a wooden plug. This limb terminates in a peg 9 cm. long which has the full width of the limb, being only pointed at the extreme end.

G. Crosses having a Spike-like Termination of the Lower Limb.

No. 154.

Wooden cross found south of the chancel in the child's coffin No. 15. It lay on the breast of the little child buried in the coffin. — 21.5 by 16 cm. (fig. 150, to left).

The two limbs are as usual joined by means of notches and a single nail. It has been a fine cross but unfortunately the surface is so much destroyed that only the main lines of the decoration are preserved. It has semicircular fields at the extremities with small projecting knobs at the root. The lower limb terminates in a spike-like peg only 2.2 cm. long.

No. 155.

Small carved cross (fig. 150, to right) found with a shroud, so hopelessly decayed that preservation was impossible, and from the remaining fragment we could not gain any information about its cut and character. The cross has lain on the naked breast of the dead person under the shroud. The whole of the upper limb is missing. The horizontal limb which is 7.8 cm. long has semicircular fields at the extremities with projecting knobs at the root. The lower limb terminates in a short spike-like peg.

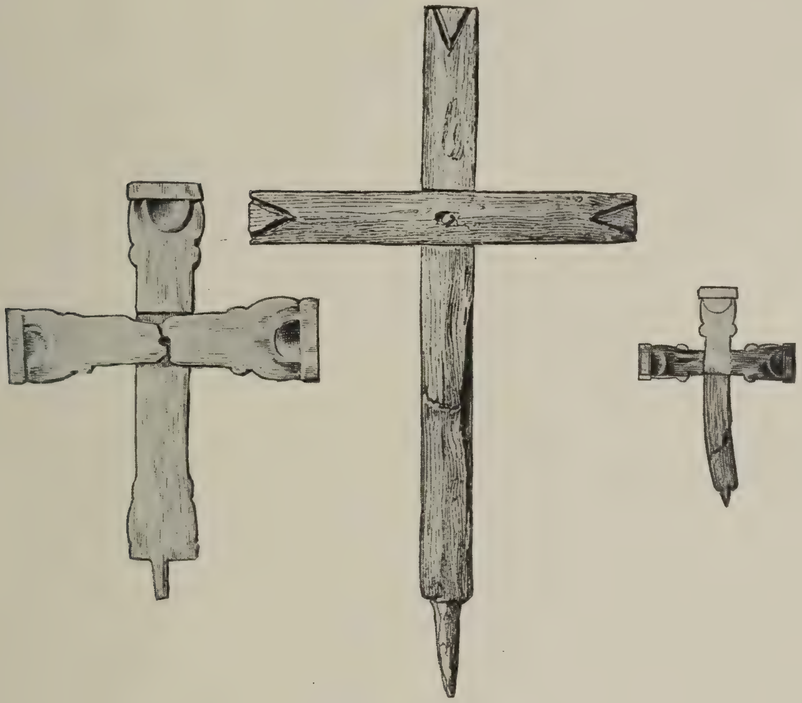

Fig. 150. Crosses, Nos. 154, 156 and 155 ($^1/_4$).

No. 156 †.

Large wooden cross found in the southern part of the churchyard at Kielsen's excavation in 1840. — 36.5 by 20 cm. (fig. 150, centre).

The two limbs are joined by means of notches and a single nail. The three extremities have a cuneiform incision, whereas the lower limb has four quite narrow transverse lines and terminates in a spike-like peg 5.5 cm. long, of the same form as in the two preceding pieces.

H. Crosses in which the Transverse Limb is inserted in a Slit in the Vertical Limb.

No. 157.

Wooden cross found with skeletal remains north of the nave of the church at a depth of barely 70 cm. below the old surface. — 19.7 by 9 cm. (fig. 151).

The vertical limb is formed of a thin stick. The lower end tapers to a sharp point, the upper portion is split to the middle. In the slit thus formed the transverse limb is inserted. It consists of a stick only 2 mm. thick, broadest at the centre, tapering towards the ends, and quite carefully shaped.

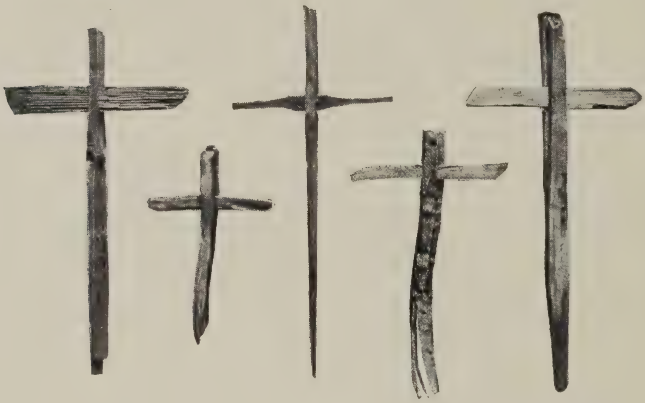
Fig. 151. Crosses, Nos. 158, 160, 157, 161 and 159 (1/4).

No. 158.

Wooden cross found in the north-western corner of the churchyard at a depth of abt. 70 cm. below the old surface, on the breast of a decomposed body swathed in a woollen shroud and covered by later (decomposed) interments. — 18.4 by 10.5 cm. (fig. 151).

Formed of two rudely shaped sticks or chips obliquely cut off at the ends. The transverse limb is inserted in a slit in the upper half of the vertical limb.

No. 159.

Wooden cross found west of the church on the breast of a body swathed in a frieze dress (dress No. 54 with cap). — 20 by 10 cm. (fig. 151).

Made of two rudely fashioned sticks cut off at the ends by one or two oblique cuts, the lower limb tapering regularly to a point. The transverse arm is inserted in a slit made in the upper portion of the vertical limb.

No. 160.

Wooden cross found on the breast of dress No. 64 which belongs to the latest objects of the find. — 10.5 by 7.4 cm. (fig. 151).

The vertical limb is simply a peeled stick cut off obliquely at the ends, its upper portion split. In the slit the transverse limb is inserted.

No. 161.

Wooden cross, the rudest of all the objects found. — 13.5 by 8.3 cm. (fig. 151).

It consists simply of two splinters, the transverse limb is inserted in a slit in the vertical limb which is not even quite stripped of bark.

I. Cross formed of a Single Piece of Wood.

No. 162.

Small wooden cross found in the western part of the churchyard near the wall. — Length 14 cm.

This simple little piece differs from all the other crosses by being cut out of one piece of wood. The limbs are rectangular in outline and are devoid of ornamentation, even the usual peg at the bottom is missing. One of the transverse limbs is missing.

J. Fragments.

No. 163.

Fragment of a cross found with coffin No. 13 south-east of the church. — 25.2 cm. long.

The preserved part is the lower portion of the vertical limb. It is smooth and furnished with a peg with rounded end 16.2 cm. long.

No. 164.

Transverse limb of a wooden cross found with hood No. 69.

It is 10 cm. long, rudely fashioned, and furnished with notches and a nailhole to join it to the vertical limb.

No. 165.

Fragment of a wooden cross found at the head of coffin No. 2, and belonging either to this or to No. 4. The preserved part is the lower portion of the vertical limb, 13 cm. long with a peg 7 cm. long.

No. 166.

In connection with the wooden crosses we shall mention the small square deal stick (19,5 × 1,5 × 1 cm.) which was found within coffin No. 30, comp. above p. 62 and 84. On two sides it has runic inscriptions which are dealt with in the Runological Section, No. I (fig. 3).

Some Remarks on the Cross Types and their European Parallels.

Among the crosses which are of special interest by their form or ornamentation there are at least four main types and among these again a whole series of variations. Our natural course will now be to try to find the sources of these ornamental shapes since we cannot beforehand take it for granted that any of them should have originated in Greenland.

There are shapes and ornamental designs so simple that they might arise anywhere without any external influence, such as the oblique extremities[1]) or the transverse grooves or rounds on the limbs,[2]) but we are so fortunate as to have, among the crosses from Herjolfsnes, at least one group of such pronounced shape that its origin can be established with the greatest certainty. It is that extensively found type in which the angles are hollowed with circular cuttings, sometimes broad and open semicircles, sometimes small and narrow almost quite closed circles. This form of ornamentation must be called very remarkable or even absurd in wooden crosses, since it weakens the frail material just at the point where the limbs were beforehand sufficiently enfeebled by the notches cut for the junction. And indeed, most of the crosses of this type were found broken at the intersection.

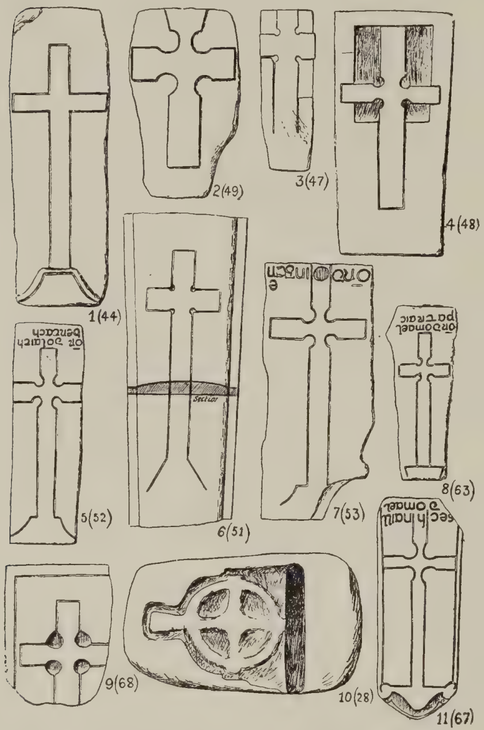

Fig. 152. Common slabs from Ireland.
Macalister: The History of Inis Cealtra.

To many readers it will at once be obvious whence this type of cross was borrowed. It is the simplified "Celtic cross" which was so long in extensive use on stone monuments — both on standing crosses and recumbent slabs — in the British Isles, especially in Scotland and Ireland[1]) (fig. 152.) This type was no doubt originally fashioned in stone, to its complete form belongs a wheel surrounding the four entirely closed rings arising at the angles of the cross. These wheel-crosses belong especially but not exclusively to the 9th century, and the simplified form with the wheel left out was used right down into the 12th century.[2])

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[1]) I cannot, however, refrain from mentioning as parallels a large group of such crosses carved on Scotch tombstones from the later centuries of the Middle Ages. Proceed. Soc. Ant. Scotland XLV (1910—11) p. 302.

[2]) For a parallel from Norway see ANFB. 1902 p. 254, fig. 6 (cross incised in the eastern wall of the chancel of Stange church, Hedemarken).

Norway and the Norse dependencies were in the Middle Ages strongly influenced by English culture. Hence the appearance of this cross type in Norway[3]) and later on in Greenland is easily explained. Though it does not occur on any of the few sepulchral slabs found at Herjolfsnes or elsewhere in the Greenland settlements, the predominant probability is that in Greenland, too, it was originally utilised for stone material and thence transferred to the little wooden crosses. That a similar transfer could be made elsewhere will be obvious on studying the fine Cross of Cong, executed in silver, dating from abt. 1123[4]) (now in the Royal Irish Academy Collection, Dublin) which, apart from its extravagant ornamentation, may be compared in shape with the neat little wooden cross No. 144 (fig. 146).

A somewhat more elaborate development of the same "Celtic" type is the large cross No. 148 which has, besides, semicircular incisions halfway up each limb. This design, too, is known from the British Isles.[5]) But I know of no parallels to No. 149, a small cross with hollowed angles. Each limb is terminated by two trapezes in continuation of each other, giving the whole cross a peculiar, crenate outline. This is a fine as well as a quaint and fanciful cross, and it would be gratifying if the design were invented in Greenland, but we have no positive proof of this as long as we have only a single specimen of it to go by.

The remaining forms, however, are well-known European types, both those having triangular or trapeziform extremities[6]) and those having semicircular extremities with or without small projecting knobs.¹) Both forms are common especially in the 13th century. The type, finally, represented by our No. 153, the small cross with the circular extremities and the nimbus-like disc at the junction of the limbs, is a form occurring very often both in Romanesque and Gothic art.²)

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[1]) J. Romilly Allen, Early Christian Monuments of Scotland II, p. 31 and 51 ("The Keills Type"). Proceed. Soc. Ant. Scotland IX pl. IV. LVI (1921—22) p. 66. Kermode, Manx Crosses, passim (mostly wheel-crosses). Macalister, The History and Antiquities of Inis Cealtra, p. 154 seq. and pl. 17 seq. (Proceed. of the Royal Irish Acad. XXXIII Sect. C. No. 6. 1916).

[2]) Macalister, loc. cit. p. 151 and 154 seq.

[3]) B. E. Bendixen, Stenkors i Bergensamterne, in "Oldtiden" II, see figs. 1, 5, 9. The same in ANFB. 1898 pl. I fig. 4 (ad p. 47).

[4]) Pictured in G. Coffey, Guide to the Celtic Antiquities of the Christian Period preserved in the National Museum, Dublin (1910) pl. XIII and XIV. Margaret Stokes, Early Christian Art in Ireland I (1894) p. 108.

[5]) Bronze crucifix found at Athlone (Royal Irish Acad. Collect. in Dublin) figured in Kermode, Manx Crosses pl. XVII.

[6]) Icelandic reliquary in the Nat. Mus., Copenhagen. Also Fett, Billedhuggerkunsten i Norge under Sverreætten fig. 8. Ugglas, Gotlands medeltida träskulptur figs. 64 and 80. Comp. also above figs. 132 and 138—140. The curved oblique edges as in No. 150 are often found in Limoges crucifixes from the 13th cent.

Actual ornamentation hardly occurs apart from very simple mouldings, transverse rounds and grooves, lines following the outline and the cross-figures frequently carved on the limbs. Only one real ornament may be mentioned, the modest square key-pattern on the upper limb of the large cross No. 148. This ornament was in extensive use during the Romanesque period, but its frequent occurrence on the stone monuments in the British Isles should be noted.³)

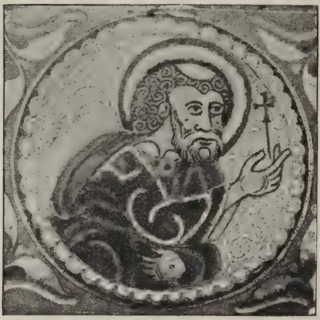

Fig. 153. Apostle holding a devotional cross.
Panel from a reliquary of Limoges enamel, 13th. cent. (Munich, National Museum).

A common feature of the crosses must be mentioned. With few exceptions they all have the lower limb terminating in a peg or spike and there can be no doubt that their prototype in this respect must have been the processional cross which was made to be inserted in a staff. In three of the crosses the prototype is very obvious. These are the two having semicircular terminations, to which may be added a third more primitive one having cuneiform incisions at the ends (fig. 150). All three are distinguished by the lower limb terminating in a thin, round spike-like pin, very peculiar for a wooden cross and no doubt copied directly from a metal cross.

Processional crosses were present in all churches. In Europe they were usually of brass or some more precious metal, at any rate to the best of our knowledge, for of course we cannot know what kind of more perishable material may have been used in village churches. In Green-

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¹) The type occurs most frequently with trefoil fields but the difference is not essential as the outline remains the same. See thus the Crucifixion in Aal Church in Norway (Fett, Norges Malerkunst i Middelalderen p. 62), the small Anglo-Norwegian copper crucifix from Bellinge (Kunstmuseets Aarbog 1920 p. 75 seq.) and the large wooden cross from Borre (Fett, Norges Kirker i Middelalderen fig. 329). Semicircular terminations are found in a small wooden crucifix from Kungs Husby in Sweden. All representations here referred to date from the 13th cent.

²) See thus Doering, Deutschlands mittelalt. Kunstdenkm. fig. 97 (cross on the slab of St. Bernward, Hildesheim). Fett, Billedhuggerkunsten fig. 20. Anderberg, Skaanske Triumfkrucifixer fig. 34.

³) Romilly Allen, Early Christ. Mon. of Scotland II p. 331.

land at any rate, it is highly probable that processional crosses of wood[1]) were used, and it is not impossible that some of the larger specimens from the churchyard may formerly have been processional crosses, but with the great majority this cannot have been the case. In these the peg is a rudiment which is not without parallel elsewhere. In fig. 153, a detail from an enamelled reliquary in Munich, such a devotional cross is seen where the peg has been retained though it is quite without significance.[2])

The correspondence pointed out with various earlier or later European monuments must not be taken as an attempt at actual dating. To the reader who is not fully acquainted with corresponding conditions in Iceland or in similar remote isles it cannot be strongly enough emphasised that the conservatism with which a style or manner of decoration once acquired may be adhered to in such remote places is practically unlimited. Even if the Greenlanders became acquainted with the Celtic crosses at the latest in the 12th century, the preserved specimens may very well date from later centuries. Thus, on one of these crosses there are runic inscriptions which, according to Professor Jónsson, cannot be of earlier date than abt. 1300. The shapes of the crosses can furnish us with no other means of dating than a terminus post quem.

The most important general information, then, that can be gleaned in this field is that the types of the early Middle Ages are predominant. It cannot be said that the Greenlanders kept slavishly to definite conventional forms — within the narrow limits the design was remarkably well varied, partly by impulses from Europe, but actual markedly Gothic forms, which had come to predominate in Scandinavia as early as abt. 1300, can hardly be traced.

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[1]) As in Mexico in more recent times. See a cross from the church in Xometla pictured in La poblacion del Valle de Teotihuacan Tom. I. 2, pl. 179 (1922), edited by the Secretaria de Agricultura y Fomento.

[2]) Cp. also numerous crosses of this shape without shaft represented on British and Scandinavian cross-slabs, e. g. slabs from Suldrup and Skarpsalling in Jutland.

Chapter IX.

Smaller Finds.

1. Drinking Vessels and Cooking Vessels.

For drinking vessels and cooking vessels, the medieval Greenlander, like the Eskimoic Greenlander of the present day, was in the main limited to the materials found in the country itself, and above all to the soapstone. In all the excavations hitherto made in Greenland, only a few broken fragments of imported goods have been found. Two of these, a piece of a pewter cup and a shard of a Rhenish stone jug, will be mentioned below. Trifling fragments of common pottery have been met with elsewhere, but as yet there is so little that it cannot be determined whether it is imported ware or made within the country.

Soapstone vessels must, however, have been the chief resource, especially for cooking purposes. This stone is soft and easily worked, and we know from a statement, somewhat fantastic it is true, in the supplement to Ivar Baardson's account that vessels capable of containing from 10 to 12 "barrels" (i. e. abt. 40 to 50 bushels) could be made.[1])

In all, even the smallest, diggings, such shards of soapstone have been found, but entire vessels are still lacking. In the National Museum at Copenhagen so much material has, however, accumulated in the course of time that, on close study, it should not be difficult to reconstruct the most frequently occurring types. Such a reconstruction would serve to elucidate possible points of contact between Norse and Eskimo culture, but must be reserved for later researches, since the material at hand from Herjolfsnes is of no great importance.

From the fragments found there, however, we chiefly gain the impression that the soapstone vessels were made on the model of the

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[1]) MoGr. XX p. 329. On soapstone quarries in Greenland see Mogens Clemmensen in MoGr. XLVII p. 346.

European earthenware vessels. The decoration most in favour consists of concentric rings which must originate from the earthen vessels turned on the potter's wheel. This is the case, too, with the mouldings of the rim, and finally we may mention a small bowl (No. 169) with straight projecting handle which is hollow, as is commonly the case in the earthenware bowls.

No. 167 †.

A large almost cylindrical but slightly concave tube of pewter broken off irregularly at both ends. Height abt. 4.5 cm., diameter 4.5—5.5 cm. Presumably part of a beaker or the neck of a ewer of late medieval type. Found by Eskimos and brought to Denmark in 1880 by G. Holm.

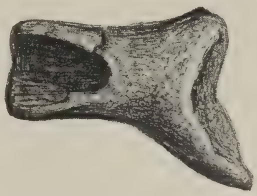

Fig. 154. The handle of a small bowl of soapstone (No. 169).

No. 168.

Shard from a jar or pitcher of Rhenish stoneware of the type of the early productions from the workshops of Cologne and Frechen. It is grey on the inside, light brown on the outside, very thin (only 0.3 cm.). Across the outside runs a sharpedged moulding, 0.6 cm. broad. Found at a considerable depth by the foundations of the southwestern wing of the dwellinghouse (cp. p. 54). This little potsherd derives great interest from the fact that, like some of the dresses, it shows the communication with Europe in the 15th century. That it is not prior to that century was corroborated by the great connoisseur of Rhenish stoneware, Geheimerat Otto v. Falke during a visit to Copenhagen.

Compared with the dated specimens from the close of the 14th century, of which the National Museum possesses several, this is of more elegant and more advanced workmanship.

No. 169 †.

Fragment of a small bowl of soapstone with partly preserved hollow handle (fig. 154). Found in a grave and presented to the Museum in 1886 by Mrs. Rosenstand, widow of Superintendent Rosenstand, Nanortalik.

No. 170 †.

Fragment of the rim of a flat bowl or pan of soapstone with an upstanding edge only 1.5 cm. high, having three deep parallel grooves on the outer side. Brought home in 1880 by G. Holm.

No. 171.

Fragment of a flat bowl of soapstone with an upstanding edge only 1.8 cm. high. The flat bottom is sooty underneath. Found in the cemetery north of the church.

No. 172.

Fragment of a rather thick soapstone vessel, rounded on the outside, with a flat base on the inside. Found on a level with the floor in the nave of the church.

No. 173.

Fragment of the rim of a soapstone vessel with canted edge. 1.3 cm. thick. From the site of the dwelling-house.

No. 174.

Similar fragment, 1.5 cm. thick. From the stable.

No. 175.

Fragment of the rim of a thin soapstone vessel. The edge is smooth, slightly rounded on the inside. Found beside coffin No. 14.

No. 176.

Fragment of a soapstone vessel 0.8 cm. thick. It is decorated with three parallel grooves.

No. 177.

Fragment of the rim of a similar vessel very slightly canted on the outside and decorated with a couple of lines. Found on a level with the floor in the nave of the church.

No. 178.

Fragment of the rim of a similar vessel. The edge is canted on the outside and has three grooves. Thickness 1 cm. Found in the cemetery, north of the church.

No. 179.

Fragment of a round soapstone vessel with smooth un-moulded edge and having a hole to suspend it by. An owner's mark is incised in the shape of a ᚴ-rune. Thickness 1.7 cm. From the site of the dwelling-house.

No. 180.

Two fragments of the rim of a very large soapstone vessel with incurved edge close to which a hole has been pierced. From the site of the dwelling-house.

No. 181.

Half of a small round soapstone vessel, abt. 6 cm. in diameter. The flat base is black with soot underneath. Perhaps a toy. Found in the western part of the cemetery.

No. 182.

Flat shard of soapstone 2.9 cm. thick. On one side are seen remains of an incised cross. From the site of the dwelling-house.

2. Spinning and Weaving Implements.

No. 183.

Half a spindle whorl of soapstone (fig. 155), unusually large. Height 4.6 cm., diam. 8.8 cm. Conical and decorated with three and three incised concentric rings. From the site of the dwelling-house.

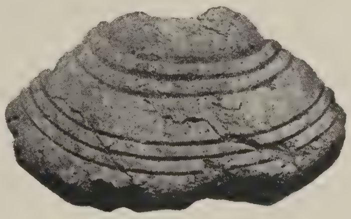

Fig. 155. Fragment of a large spindle whorl of soapstone (No. 183).

No. 184.

Whorl of soapstone with rounded top. Diameter 3.5 cm. A small cross is incised on one side. Found in the slope by the shore south-east of the church.

No. 185.

Whorl with irregularly rounded top. Diameter abt. 3.5 cm. On the lower side are incised some lines framing the spindle-hole. From the site of the dwelling-house.

No. 186.

Half a whorl with rounded top. Diameter 3.9 cm. Found in the churchyard west of the church in a very superficial layer.

No. 187.

Ten loom-weights found in different places on the site of the dwelling-house. Several are fragments of former cooking-vessels. One piece has an owner's mark, another a linear and circular ornament, a third a cross incised across the hole for suspension.

No. 188.

Soapstone with suspension-hole, probably a loom-weight, on one side of which are incised three little crosses with holes pierced at the terminations and the intersection. Found at a spade's depth west of the south wall of the church

No. 189.

The handle of a little weaver's sword or "spatha" (fig. 156), made of deal, found at a depth of abt. 20 cm. below the old surface north of the church near coffin No. 28.

Its present length is 14 cm., but only quite a short piece of the blade itself has been preserved. It has the shape of a real dagger or a miniature sword; the cap-shaped pommel and the quillons which are reduced to a broad band-like ring, correspond to the sword-type prevalent in the late Viking Age (11th cent.). Near this piece lay the upper part of another handle also of deal and roughly pearshaped.

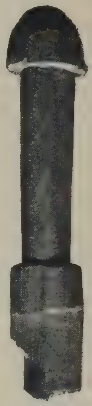

Fig. 156. The handle of a weaver's "sword".

3. Other Implements.

No. 190 †.

Oblong granite stone (22.5 cm.), having seemingly been used as a hammer. Sent in by Commodore G. Holm in 1880.

No. 191.

The top of an iron nail with a large flat head. From the site of the dwelling-house.

No. 192.

Small round iron bar. Length 4.2 cm. Found north of the chancel.

No. 193.

Awl or bodkin fashioned of bone, probably of the radius of an ox. Length 11 cm. From the site of the dwelling-house.

No. 194.

Fragment of a small square whetstone found in the upper layers north of the chancel (possibly of Eskimo origin).

No. 195.

Small oblong soapstone, roughly lens-shaped, but with blunt ends. Length 5 cm. Breadth 2.3 cm. Resembles a sinkstone for a fishing-line (cp. ANFB. 1893, fig. 11), but lacks holes for the line. Found near the chancel under a stone fallen from the wall.

No. 196.

To the implements we also refer the fragmentary piece shown in fig. 157 though we cannot give any explanation of its use. It consists of a flat soapstone (3 to 1 cm. thick) with plain sides. On one of the sides is carved a hammer, the other side bears the impression of wear. The lower end has been broken off, it must have terminated in a broad point. The original length has been abt. 18 cm., its breadth abt. 18.5 cm.

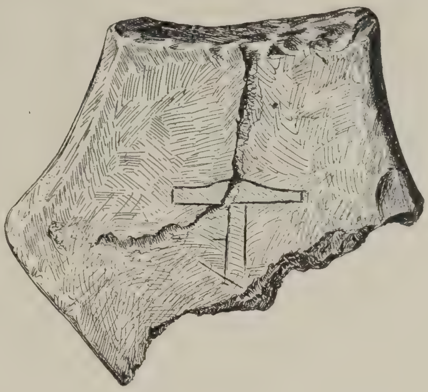

Fig. 157. Flat fragmentary implement of soapstone with incised hammer (No. 196).

4. Various Objects.

No. 197.

Oval box of whalebone (fig. 158) found in an interment in the church where it was laid under the head of the dead person. It is 20 cm. long, 12 cm. broad, and must originally have been abt. 8 cm. high. The base is of deal, while the sides are of whalebone. No lid was found. A sample of its contents proved on microscopical examination to contain blood corpuscles, it must therefore be assumed to be a provision-box.

This box is the only object of the find which might point to cultural communication between the Norse and the Eskimos, since quite similar boxes are well-known among the Eskimos, see fig. 159.

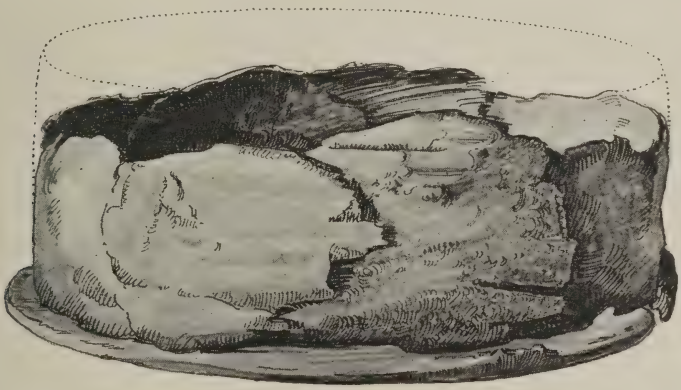

Fig. 158. Whalebone box (No. 197).

No. 198 †.

During Kielsen's excavations in 1840 three small pieces of whalebone, 10—14 cm. long, were found in a grave. They may possibly originate from a similar whalebone box.

No. 199.

Half of the deal bottom of a box or a smaller barrel which was abt. 28.5 cm. in diameter. On both sides 2 × 2 concentric circles are incised.

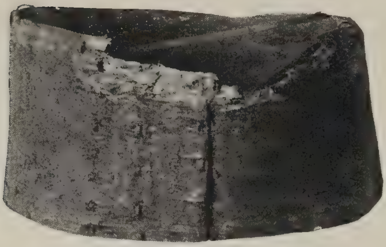

Fig. 159. Eskimoic whalebone box from the Umanakfjord.
Copenhagen. National Museum.

No. 200.

Pommel of wood shaped as shown in fig. 160 and with the owner's mark cut in the upper surface. Found in the same grave as the whalebone box (No. 197) lying at about the waist of the dead person who had turned entirely to dust. It is 3.5 cm. in diameter and 2.5 cm. high. It must no doubt have been placed at the end of a hilt (e. g. on a dagger), for the attachment of which a hole has been pierced on the lower side.

No. 201.

Eleven pieces of brass originating from one or more churchbells found in the churchyard during the excavations in 1921, or brought home on former occasions.

The larger pieces have a thickness of 1.8—1.9 cm. On one of the pieces two flat raised bands are seen at a distance of 1.2 cm. from each other. Over the upper one may be seen the remains of a majuscule inscription that must have been incised in the mould in which the bell was cast. This technique is well-known from church bells in northern Europe dating from the 13th and 14th centuries.

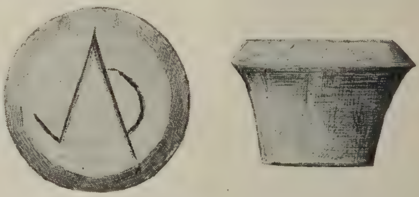

Fig. 160. Pommel of wood with the owner's mark incised. Seen from above and from the side (²/₃).

No. 202.

Two draughtmen, cylindrical in shape, roughly fashioned of bone and devoid of all ornament. Diameter abt. 5 cm. Height 2 cm. Both were found on the site of the dwelling-house.

No. 203.

Granite stone of irregular shape, abt. 18 × 14 × 14 cm. broken off at the sides, but with a fairly flat-hewn upper surface in which was cut a circular, roughly bowl-shaped pit, 6 cm. in diameter and barely 2 cm. deep. What this was meant for I cannot say. We found a similar pit in another granite stone lying in the upper layers in the churchyard, north of the church. This stone was 90 cm. in height, of regular shape, almost like a short pillar, square in transverse section (25 × 26 cm.). In its upper surface there was a round pit 9 cm. in diameter. Its shape is very regular in both stones. Probably it served as touch for a door-hinge or "door-tenon". The latter of the two stones was set up by us in the meadow north of the churchyard.

5. Animal Bones.

In 1921 there was no opportunity of digging in the Norse refuse heaps, so bones were only found quite accidentally. The greater part were seal bones which the Eskimos could determine for us with certainty, they were therefore not brought to Copenhagen. The remainder were determined by the late H. Winge as follows:—

Reindeer	upper arm.
do.	heel bone.
do.	rib.
do.	spinal process.
Ox	fragment of rib.
do.	two molars.
Sheep or goat	two bones.

Chapter X.

Did a Deterioration of the Climate occur in Greenland in the Late Middle Ages?

One of the most burning questions in the history of the old Norse colonies is the question whether the conditions of life and the navigation conditions were the same at that early period as nowadays, or whether a deterioration of the climate and ice conditions occurred in the late Middle Ages.

The problem is an old one. In the 17th, 18th and part of the 19th century, when it was believed that the eastern colony had been situated on the east coast of Greenland, but every attempt to land on that coast¹) was frustrated by the baffling barrier of the ice-belts, the conception very naturally gained ground that the coast had become blockaded by ice after the period of the Norse settlement. When, however, the correct explanation, that the eastern colony had been situated in the district of Julianehaab, had become generally accepted in the last century, one of the main grounds for believing in a change in the ice conditions disappeared.

But in modern times the problem again presented itself, and the first to take it up was Commodore G. Holm who in the report on his archæological investigations in 1880 says that "it seems difficult to understand how sufficient winter fodder for the cattle could be collected in those days if we are not to assume that the climate was milder, so that the cattle could be kept out a longer time of the year than is now the case. That the ice drifting along the coast has increased in historical times is mentioned in old records, and seems to be a necessary assumption if we want to understand how the early Norse settlers were able to sail to and from the district of the present Julianehaab; and further,

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¹) See C. F. Wandel, En Fremstilling af vort Kjendskab til Grønlands Østkyst samt de af Skonnerten "Ingolf" i 1879 foretagne Undersøgelser i Danmarksstrædet. MoGr. VI p. 1 seq.

no one will be able to deny that this ice, now lying everywhere outside this part of the country, considerably increases the severity of the climate".[1])

This is an experienced and discerning man's judgment, the importance of which should not be underestimated, but a more exact, scientific elucidation of the problem was not yet attained. It is only quite recently that the question has been seriously taken up for discussion by the Swedish geophysicist and hydrographer Professor O. PETTERSSON.[2]) From its bearing on Greenland alone the problem has by him been raised to a more comprehensive sphere and included in an ingenious hypothesis which assumes that a change in climate occurred in the 14th—15th centuries, the effects of which may be traced from Greenland and Iceland across Scandinavia as far as the interior of Asia.

Professor Pettersson sees the cause of this deterioration of climate in hydrographic conditions, changes in the oceanic circulation which are again traceable to cosmic causes, viz. to variations in the attractive power with which the sun and moon combined affect the waters of the ocean. The attractive power is greatest during a constellation designated as perihelion-node-apside, in which both the heavenly bodies have reached their maximum of proximity to the earth and of declination.

This constellation only occurs abt. each 1850th year. It occurred last in the year 1433 A. C., and before that abt. 350 or 400 B. C.

It causes violent fluctuations in the tides, resulting in destructive bores, and further involving a liberation of the icemasses of the Arctic which drift southwards; the freezing of certain other seas; alterations in the migrations of the fishes etc.

There is here no question of sudden catastrophes but of periodic fluctuations, and between two maxima lies a minimum with a period of rest in which the tidal power has no disturbing effect, and in which the temperate zones have dry and warm weather, while, on the other hand, a firm, continuous sheet of ice is formed in the Arctic, because sufficient quantities of warm water are not driven to this region.

Now, according to what is commonly assumed by archæologists, it really seems as if a fatal change of climate occurred at abt. the middle[3]) of the first millennium B. C., causing the destruction of the rich Bronze Age culture in Scandinavia; and Professor Pettersson has adduced a series of diverse testimonies showing that similar conditions asserted themselves in the 14th and 15th centuries when the above-described constellation last occurred. There is something very alluring about this theory, but as yet it cannot be designated as more than a fruitful working hypothesis, the details of the evidence being much disputed.[1]

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[1]) MoGr. VI p. 72 seq.

[2]) Klimatförändringar i historisk och förhistorisk tid (Kungl. svenska Vetenskapsakademiens Handl. Vol. 51. No. 2. 1913). Climatic variations in historic and prehistoric time (Ur Svenska Hydrografisk-Biologiska Kommissionens Skrifter. V 1914). Innere Bewegungen in den Zwischenschichten des Meeres und der Atmosphäre (Nova Acta Regiae Soc. Scient. Upsaliensis Ser. IV. Vol. 6. No. 2. 1923).

[3]) Perhaps, however, it occurred a couple of centuries earlier. Cfr. Hahne, Die geologische Lagerung der Moorleichen etc., Veröffentl. d. Prov. Mus. zu Halle 1918.

We cannot here discuss the problem in its entirety, we must confine ourselves to conditions in Greenland which, however, play a conspicuous part in the argumentation. On this point Professor Pettersson, assisted by his daughter Miss A. PETTERSSON, has subjected the historical sources to a very acute criticism and found weighty evidence rendering it probable that a decisive deterioration of the climate and especially of the ice conditions by the coasts took place in the course of the Middle Ages. I shall here point out some of the evidence to which we must ascribe most importance, beginning with the less essential details and concluding with the main proofs.

The Norwegian "Konungs skuggsjá" (King's Mirror)[2] from the beginning of the 13th century, contains detailed information on conditions in Greenland which on all points where we are able to check it seems sound and very trustworthy. It is said there that the Greenlanders subsist chiefly by cattle-rearing and hunting — they have large and good farms with much cattle and many sheep, and produce much butter and cheese.

Of grain production there is very little, the greater part of the population do not know what bread is, but, it is added — and that is the chief point here — the most noted and richest among the farmers try to grow corn for the sake of experiment. We may, I think, safely say that such an experiment now-a-days would be quite hopeless.[3]

Another small trait deserving consideration is the confusion in the late Middle Ages of the two names Blàserk and Hvitserk (blàr = dark, hvítr = white). Blàserk must have denoted a dark (snow-free) mountain on the east coast of Greenland, while Hvitserk must presumably have been one of the great glaciers moving towards the sea or perhaps even the inland ice-cap as seen behind the east coast from the sea. Blàserk is chiefly mentioned in the earlier sources describing the voyage of Eric the Red to Greenland, but it is subsequently superseded by the name Hvitserk in such a way that one would not think two different mountains were meant. In Icelandic manuscripts they are never mentioned simultaneously.[1] It would certainly seem a very natural explanation that Blàserk was forgotten as a landmark in more recent times because it had changed its colour to white and no longer answered to its old name.

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[1] One of the ablest critiques is that of A. Norlind, who does not, however, quite reject the hypothesis. He admits that there are circumstances pointing to a more continental climate in the Middle Ages, and that hydrographic conditions may have been the cause. (Ymer 1915. Lunds Universitets Årskrift N. F. vol. 10. 1914).

[2] ed. F. Jónsson. p. 72.

[3] In contrast to the sober and cautious account of the King's Mirror, the reliability of which we have no reason to doubt, it sounds more fantastic when it is stated in a supplement to Ivar Baardson's description of Greenland that in this country was grown the "best wheat ever known".

A third point is the migrations of the Eskimos to the north and south. Their occupation as seal hunters demands movable ice which the seal prefers; they can neither exist by ice-free waters nor where the ice lies immovable along the coasts most of the year. When the Norsemen came to Greenland, they found no Eskimos, but they found traces of earlier Eskimo settlements. The small polar people had migrated towards the north, but in the course of the 13th century the tide turned, and they began to appear again within the Norse domain. As late as the middle of the 13th century they do not seem, however, to have got any farther than the regions round Disko (Kroksfjardarheidi).[2] In the 14th century they press forward more and more insistently, and by the middle of the century they would seem to have made themselves masters of the Western Colony, while one or two centuries later they inhabit the whole coast as far as Cape Farewell.

There must be some very real reason at the back of these migrations of the Eskimos, no doubt an effort to get to the best hunting-areas. It is an obvious assumption that, when they left the southern settlements prior to the arrival of the Norsemen, it was because the drift ice down there had become too scarce, and when they subsequently went back to them again, it was because drift ice had appeared again, or perhaps because the ice in the north had settled too firmly.

It has further been pointed out as a striking fact that the Icelandic sagas never mention ice as a hindrance to navigation either when describing Eric the Red's voyage of exploration or other voyages to Greenland in the first period of colonisation, or when they describe the voyages to Vinland or the Norse excursions to the uninhabited tracts in the north (Nordrsetur), though they mention so many other obstacles and difficulties. Only in one case we might perhaps, by a favourable interpretation, trace a reference to the drift ice, viz. in Torfin Karlsevne's voyage to Vinland in 1003.[3] It is stated there that from Brattahlid he first sailed northwards to the Western Settlement and further on to Bear

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[1] Nansen, Nord i Taakeheimen p. 223 seq.

[2] GHM. III, p. 238 seq.

[3] Eric the Red's Saga, chap. VIII, ed. G. Storm p. 31.

Island and thence put out to sea westwards. This route might seem to have been chosen to avoid the drift ice, but was more probably taken for the purpose of inspecting the farm which Karlsevne's wife Gudrid owned in the Lysefiord.[1])

The first time we have a direct mention of the ice near the settlements is abt. 1130 in the saga about Einar Sokkeson.[2]) — It is alluded to in connection with a deadly quarrel over a wrecked vessel between the Greenlanders on one side led by Bishop Arnald and Einar Sokkeson, and some Norse visitors on the other side. The quarrel was settled by arbitration which amongst other things ordered the speedy departure of the Norsemen. But then, it says in the saga, ice came drifting, barring all the fiords, and the Greenlanders were already looking hopefully forward to getting hold of the strangers if they did not get away as quickly as the agreement demanded. But at the change of the moon all the ice drifted away again, and the traders left Greenland with a fair wind.[3])

This situation reminds us very much of conditions now-a-days towards the end of the summer, and it would of course be too bold a conclusion to draw from the silence of the earlier sagas that similar phenomena could not have occurred already during the first period of colonisation. But it is difficult to imagine that the ice should then have been as dominant an obstacle to navigation to South Greenland as now-a-days.

On this point, however, we need not entertain any doubt at all. It appears very clearly from the sources and indeed, it is even mentioned directly, that in the Middle Ages it became necessary to alter the older courses owing to the increasing accumulation of drift ice.

Professor Pettersson thinks that in the "Vetus Chorographia" which Bjørn Jónsson copied in his "Greenland Annals" in the 17th century he has found Eric the Red's original course which, instead of following the route south of Cape Farewell, passed through the straits north of the island on which Cape Farewell is situated, which are now only passable with the greatest difficulty.[4]) If this could really be established, we should have striking proof of a radical change of the ice conditions since the year 1000, but I must admit that I do not see the warrant for such an hypothesis. What Mr. Pettersson interprets as a sailing direction is no doubt only a list of fiords.[1]

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[1]) The voyage further northwards to Bear Island (Disco Island?) is incomprehensible.

[2]) This saga is only found in the Flatey-book from the latter half of the 14th century. It is of course difficult to tell whether a small trait like the above-mentioned really dates back to the historical events described or whether it is a later embellishment.

[3]) GHM. II, p. 716 seq.

[4]) Klimatförändringar p. 34 seq. See, however, the statement of Dr. Bay Schmith in "Politiken" 1924, April 24. and 29.

But even if the difference between now and then was not quite so conspicuous, there can hardly be any doubt that during the first period another course was followed than later on.[2] The course originally followed was from Snefjellsnes in Iceland due west across the narrowest part of the Denmark Strait until the Greenland mountains came in sight, whereupon the southward voyage could be continued as a sort of coastal voyage. Hence it says, in the introduction to Landnama, that from Snefjellsnes whence the voyage to Greenland is shortest, there is a four days' (i. e. two days' and two nights') westward voyage across the sea.[3]

Not until later on, says Ivar Baardson in the middle of the 14th century,[4] did the course have to be altered, because ice had now come from the north-eastern end of the sea so that nobody could follow the old route without risking his life. The new sailing directions instructed one to go due west for one day and one night only, and after that south-west.[5]

Ivar Baardson is thus well acquainted with the drift ice and its dangers, but, we must ask, does it appear from his statement that in the 14th century the drift ice had come as far south and with equal force as now-a-days? The problem will be thrown into particularly strong relief if regarded from the special point of view of this book, i. e. with reference to Herjolfsnes. It must be admitted that we cannot, in this way either, reach any compelling or conclusive result, here again we can only work with probabilities. But only on a special and, in my view, not too probable assumption is it possible to produce harmony between conditions in the Middle Ages and now.

In chapter I we heard of the conspicuous rôle played by Herjolfsnes in the Eastern Settlement as the common port of landing for trading vessels. To any one who studies the map without special knowledge of Greenland this will seem very reasonable since Herjolfsnes is situated in the southernmost part of the colony not far from Cape Farewell. But any one who is familiar with conditions now-a-days cannot but feel surprised. For in our day the ice, which from the early spring drifts down along the east coast of Greenland, is carried by the current round Cape Farewell up along the west coast where it does not scatter till further north, and until late in the summer the whole region until north of Julianehaab Bay, i. e. most of the Eastern Settlement, is regularly blockaded by ice. The normal course now-a-days would thus by no means be to steer for land at Herjolfsnes, but on the contrary to pass by the whole settlement and push through the more scattered ice to the north of it, and then steer southward inside the ice-belt. In the time of sailing vessels, the captains going to Julianehaab as a rule rounded Nunarssuit (Cape Desolation) and then steered through the waters behind this island in order to avoid collision with the ice. With such a course Herjolfsnes becomes one of the remotest points of the settlement. It was only due to exceptionally favourable ice conditions that Norden-

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[1] With regard to the remarkable insertion referring to Eric the Red which causes P. to connect the fiords mentioned in the Chorographia with Eric's original sailing route we may refer the reader to the undoubtedly correct comment in GHM. III, p. 230. The contested text has been printed by F. Jónsson in MoGr. XX, p. 319.

[2] A sober and perspicuous account of what is known about conditions along the east coast of Greenland in the Middle Ages is given by G. Holm in his paper "Gunbjørnsskær og Korsøer" (MoGr. LVI, p. 291 seq.) in which amongst other things it is proved that the two groups of islands mentioned in the title were situated near Angmagssalik. Cp. also Nansen, Nord i Taakeheimen p. 214 seq.

[3] GHM. III, 210. Cp. Holm p. 294.

[4] GHM. III, 248 MoGr. XX, p. 322 seq.

[5] The text handed down to us is not very satisfactory on this latter point. The reading established by F. Jónsson gives no direction whatever as to how or how long to sail after the first day and night until the waters round Cape Farewell have been made.

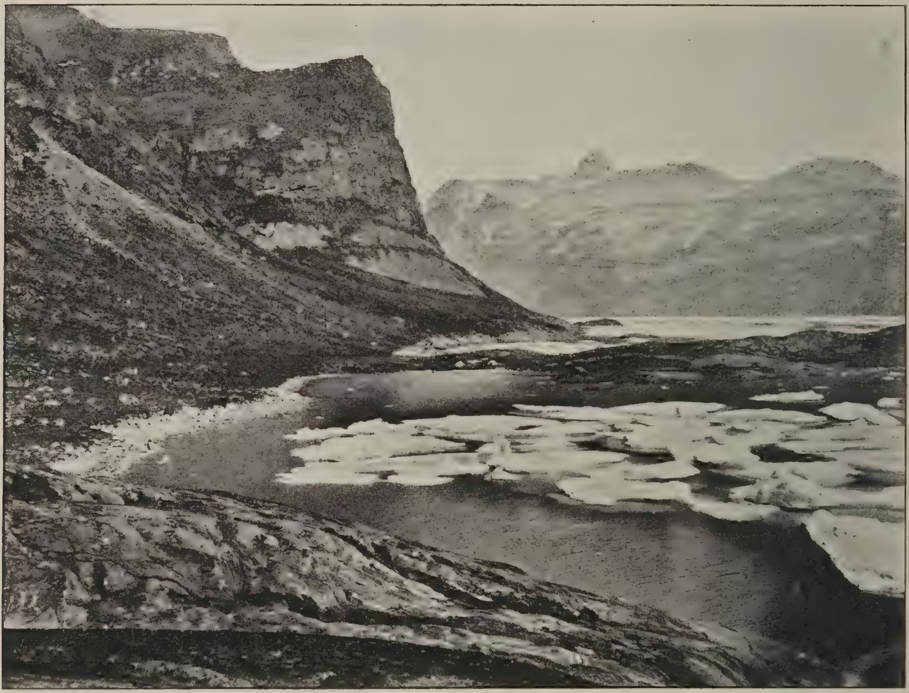

Fig. 161. Herjolfsnes, blockaded by drift-ice in August 1921.

skjöld could make straight for Frederiksdal by Herjolfsnes in 1883,[1]) and on our own expedition to Herjolfsnes in 1921 we were surrounded by ice — and thus excluded from the open sea — during most of the summer (see fig. 161).

But Ivar Baardson does not seem to know any dangerous obstacles in the way of ice by the coasts of the Eastern Settlement itself, for he, more than any one, emphasises the importance of Herjolfsnes as a landing place. First he mentions the old course from Iceland to Gunbjørnsskær which cannot be sailed any more on account of the ice, then the course from Bergen to Greenland where ships put in to Herjolfsnes, and finally the new course from Iceland ending at the same port. The ice to be avoided lies at Gunbjørnsskær (Angmagssalik) but there is no mention of danger by Cape Farewell.[2])

To this it may be objected that we cannot ascribe any significance to these facts since, as early as 100—150 years before the time of Ivar Baardson, the King's Mirror gives a description of the ice conditions corresponding exactly to conditions now-a-days.

We quote the following passage[3]):—

"As soon as most of the great ocean has been traversed, there is such a great superfluity of ice on the sea that nothing equal is known in any other place in the whole world, and it lies so far from land that there is no less than four or more days' journey thereunto if one travels on the ice, but this ice lies more to the north-east or the north outside the land than to the south and south-west or to the west, and therefore any one who wants to make land should round it, heading south-west and west until he has passed all the places where ice is to be expected, and then make straight for land. But it has continually happened to people that they have sought land too soon and have therefore got into this ice".

If this text is interpreted without any knowledge of the special circumstances, it really seems to give a picture that corresponds to present conditions. When the great ocean has been traversed and the ice is encountered, one must be careful not to seek land too soon, but keep clear of the ice belt and only make for land after passing it — any modern traveller to Greenland will subscribe to these words.[1]) It is evident, however, that the directions quoted in the King's Mirror refer to a sailing-route, which passed rather near the south coast of Iceland (cp. the sailing direction from the Hauks-book, above p. 4) and touched Greenland not at Cape Farewell, but some distance up the east coast. Truthful as the author is, he says at once that the ice he has mentioned lies more to the north-east or north than to the south and south-west or the west, in other words, it is especially farther up the east coast (by Gunbjørnsskær as Ivar says) that the ice is present, and therefore, he says, — this "therefore" should be noted — the course should be laid towards the south-west and west past the ice before land is sought. Thus it was the fear of the drift-ice along the east-coast which principally determined the course, as we found it mentioned too by Ivar Baardson, and when it was at last laid west (which perhaps means north-west), it was presumably merely to reach the settlement (Herjolfsnes). If the purpose had been to pass the settlement itself, this proceeding would be so unusual that it would only have been natural to mention it directly.

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[1]) When the meeting house and church of Frederiksdal (above fig. 11), now demolished, were built in 1826, the timber was sent from Copenhagen to Julianehaab and thence laboriously transported piece by piece in umiaks to Frederiksdal. ("Grønland i Tohundredaaret for Hans Egedes Landing" II, p. 557).

[2]) As already mentioned the text is somewhat obscure. It says finally — presumably after some day's passage to the south-west, so that the region round Cape Farewell had been reached — that the course should be due north-west for one day and night until the ship comes under the high coast Huarf (i. e. Cape Egede, Kangeq on the Sermersôq Island), below which Herjolfsnes is situated. When a north-west course is to be held so long, one might be tempted to assume that it was laid a good way south of Cape Farewell in order to avoid ice (even if it is not actually mentioned); but if there were ice round Cape Farewell, Herjolfsnes could not be expected to be accessible.

[3]) F. Jónsson's edition p. 67. GHM. p. 314 seq.

That Herjolfsnes was really, until the beginning of the 15th century at least, "the common port for Norsemen and traders", is most vigorously confirmed by the excavations in 1921. The dresses which follow the European fashions so closely or — to mention another thing — the Rhenish stone jar of which a fragment was found (No. 168), are only conceivable in a place having direct communication with foreigners, in other words a trading port. In the more remote parts of the settlement conditions were no doubt more primitive and uninfluenced by European culture.

The only way to reconcile the rôle played by Herjolfsnes in the Middle Ages with its present situation is by assuming that the traders only have come to the Norse colony late in the year. We must admit that this possibility is in fact present. As in Iceland they were no doubt prepared to winter in the country, and if they wished to return in spring, they could more easily do so from Herjolfsnes, where the winter ice broke up early, than for instance from Brattahlid which was in the interior of a fiord and was no doubt frost-bound till the drift-ice came in the spring and superseded the firm fiord-ice. This latter circumstance is no doubt — apart from other facts — one of the main reasons why Herjolfsnes was so suitable for a wintering port. But if we are to assume that vessels only visited the country in the autumn, it is certainly very peculiar that neither the author of the King's Mirror nor Ivar Baardson find it necessary to mention this fact though they give other information explaining conditions in and navigation to the country. When they find it necessary to mention the danger presented by the ice on the east coast which may be avoided by taking a certain course, it must be equally important to mention that there is a similar danger along the west coast throughout the summer, and that it may be avoided by delaying navigation till the autumn.[1] Compared with this it is a highly characteristic fact that only in the very last communication we have about medieval Greenland, in the recently found papal letter of 1492,[2] do we find it mentioned that owing to ice, navigation to the country can only take place in August.

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[1]) Thus, too, Dan. Bruun, The Icelandic Colonization of Greenland p. 24. In the same passage Bruun tries to show that Huarf is Nunarssuit (cp. p. 235, note 2) but that seems quite untenable.

Our excavations in 1921, however, brought a circumstance within our observation which in a very curious way supports the hypothesis that a deterioration of the climate occurred after the Middle Ages, and this is the occasion of our here taking up the subject for discussion. All the articles found, wooden objects and costumes, are the sort of things that are with difficulty preserved in the earth, and we may say without exaggeration that in this respect the find is unique. Exceptional conditions must then have been present. Favourable soil (peat-bogs) may have a preserving effect, but at Herjolfsnes there was only gravel and sand which have only the slightest preservative power in regard to objects of the kind here in question. In Egypt ancient costumes have been preserved owing to a stable heat and drought. In Greenland, conversely, damp and cold have prevailed, but of a similar stable character. The interments lay at greatly varying depths. We had not to dig deep to find the first, but they were in poor preservation and could not be taken up. But it may be said of almost all the really well-preserved finds that they were exhumed from layers that nowadays were frozen all the year round and lay below the present limit of thaw at midsummer time. This was the reason why we could not in 1921 find a single trace of Kielsen's work outside the church-ruin, though according to his own statement he had dug up and turned over the whole churchyard in 1840. In the few days he worked, he simply could not penetrate to the depths which would have yielded a positive result. To begin with we suffered the same fate. We reckoned with having about reached the bottom when we reached the limit of thaw, and it was only when we dug a trench in the frozen layers to drain off the water that kept bubbling up as the earth thawed, that we understood the real state of affairs. For at the bottom of this trench we struck against the top of a coffin. These depths did not become accessible to us until the sun could take effect on them as, little by little, we removed the upper layers. We could not possibly use the pickaxe, that would have spoilt all. Once we tried thawing up the ground with hot water, but I was afraid the woven material would not stand the sudden change of temperature.

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[1] As regards the season of navigation to Greenland it may be stated that the Norwegian merchantman sailing to Greenland in 1341 started in August (GHM. III, p. 886). This fact would seem to indicate a knowledge of the ice difficulties earlier in the summer, or is not at any rate at variance with such knowledge. On the other hand it is said of Thorkatla in Skaldhelga-rimur (GHM. II, p. 534) that she left Norway for Herjolfsnes in the spring, a testimony in the opposite direction, but I shall not put this source too severely to the proof. The action of the poem is laid in the 11th century, but the poem itself dates from the 15th century even if we must assume its theme to be derived from an earlier saga (cp. above p. 10 seq.). King Magnus Smek's letter of 1355 ordering a ship to be sent to Greenland (mentioned below pag. 250) is issued on October 28., which would in any case seem to be an unsuitable season for a voyage to Greenland.

[2] Reprinted by G. Storm in Norsk historisk Tidsskrift 3. R. II, p. 407.

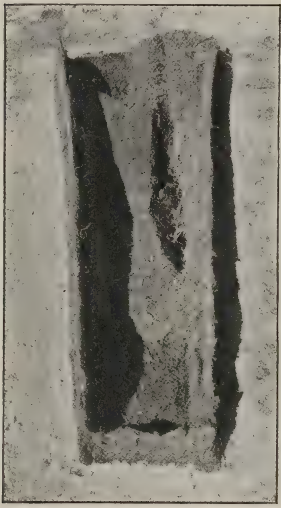

Fig. 162. A "hairy" coffin (No. 9) penetrated and matted with plant-roots.

It cannot be that a grave was hewn for the dead in the frozen earth.[1] The corpses would then at once have been coated with ice, and the reports read in American papers shortly after our return, stating that we had found vikings encased in icebergs with the skin preserved and hair and beard as soft as silk, would not have seemed wholly absurd. But quite the reverse was the case. While the shroud in a number of cases was well-preserved, the body had decayed to a clayey mass, and even the skeletal remains were as a rule in strikingly poor preservation.[2] About the coffins may be said the same as about the shrouds. Several of them were as well preserved as if they had been lately lowered into the earth whereas not as much as a bone of the corpse was left in a single one of them.[3]

There is, however, another circumstance which shows that the bodies were not always encased in ice, but that the earth thawed round them, at any rate in the warmest season. All but one (No. 39) of the costumes and also part of the coffins were pierced by and matted with plant roots which had literally sown them to the ground in the upper layers, so that they had to be torn or cut loose, and which could even be shown as quite fine fibres in the very deepest-lying costumes. Fig. 162 shows a coffin all "hairy" with roots that have grown through it.

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[1] That may of course have been done in the winter just to get the dead buried, if it was not here, as elsewhere, put off until the ground thawed, but as the facts show (comp. the following about the plant roots), that does not take us down below the summer limit of thaw.

[2] In a few cases remains of putrefied flesh could still be found on the bones.

[3] As stated above (see especially chapter IV) shrouds and coffins were hardly ever found together; some bodies were laid in coffins, others were simply laid in the grave wrapped in their old clothes.

That the roots should have penetrated into the frozen earth is entirely out of the question. On this point I have consulted one of the ablest experts, the botanist Mr. Chr. Kruuse who, on the basis of numerous observations in the field, confirms the fact that roots avoid frozen soil, always bending aside and taking up a horizontal position, though often only 5—10 mm. above it.

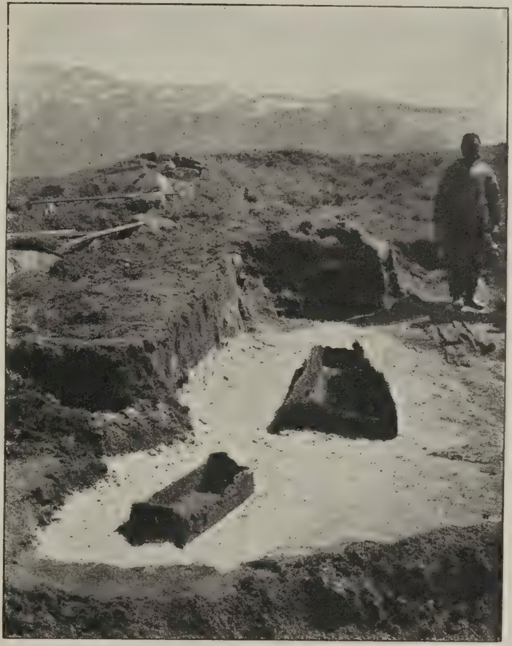
Fig. 163. Coffins Nos. 9—10.

Of course we must reckon with a gradual rising of the surface so that the interments have in the course of time come to lie at a deeper level than originally. This is a phenomenon known not only from Troy and Forum Romanum, but from every village church whose base has gradually become covered by earth that has "grown up" round it. In Greenland, however, the "growth" or rising of the surface is very slow, and in the churchyard the old surface could be very exactly calculated both by the foundations of the church and by the stone steps in front of the small entrance door on the northside, while we may take it for granted that the ground had the same inclination as now.[1] Finally the upper layer of interments give us a fixed and indubitable limit for the surface in former times since they must of course have been quite covered with earth.

Fig. 163 shows two coffins, the bottom of which lay respectively 65 and 85 cm. below the present surface. If we assume the old surface to have been 25—30 cm. lower it is amply and cautiously calculated. On this assumption the bottoms would come to lie 35 and 60 cm. below the old surface, and as the heights of the sides are known, we calculate that the lids can only have been covered by 20—25 cm. of earth (comp. above p. 74 seq.). Another case is shown in fig. 164. The bank of earth seen behind the coffin is here laid bare as far as the limit of thaw in the warmest season (the middle of August) and here, at this depth, already, were found the uppermost layers of interments which, as we can say with certainty, must have lain below the old surface. From this ledge there was again abt. 70 cm. to the bottom of the coffin. Still deeper lay the coffin shown in fig. 165. In the top lefthand corner of this picture is seen one of the small foundation stones from the western extension of the church, it must no doubt have lain just at the surface, if not under the ground. From it there was 1.20 m. to the bottom of the coffin.

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[1] The débris from the walls which must of course have raised the surface a great deal had quite predominantly fallen inside the church.

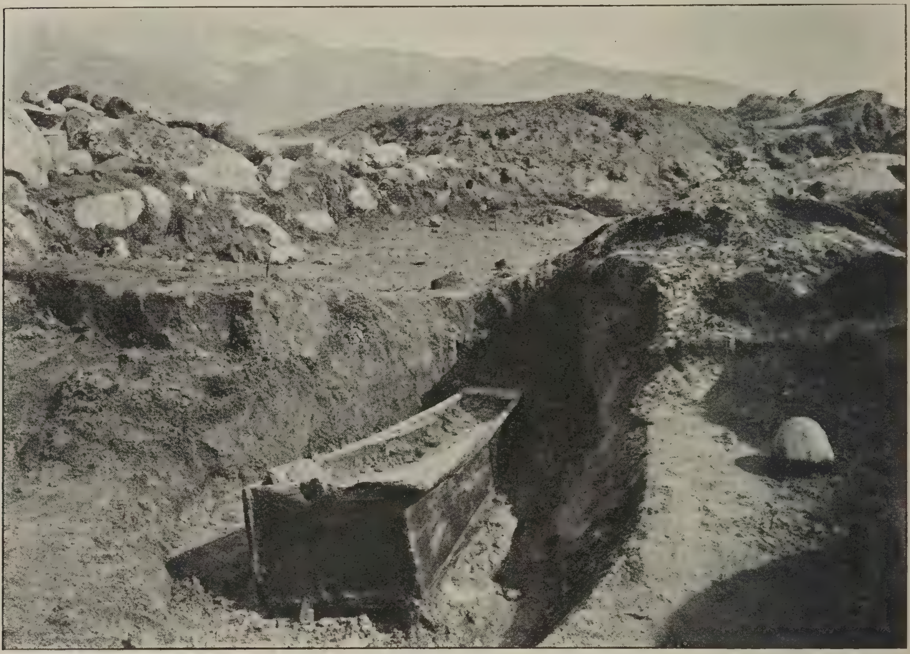

Fig. 164. Coffin No. 29, during excavation.

A calculation of the place of the surface in the Middle Ages must of course always be based on a rough estimate, but I must maintain, that to be on the safe side, I have if anything exaggerated the difference between now and then. With most of the finds I measured the depth just before or after the exhumation — some days, however, the weather rendered all levelling impossible — and in the description of the individual pieces the calculated depths are given. To get a comprehensive view of the figures they have been tabulated on p. 262 seq. in connection with the list of finds. From the table it will appear that the finds that were in such a state that they could be exhumed lay at a depth below the old surface ranging from 30 to fully 130 cm. What lay above a depth of 55 cm. was as a rule not well preserved, a great part of the best things lay at a depth of at least 1 m., while the earth in South Greenland according to the experience of myself and others does not thaw nowadays in more than abt. 70—80 or at most 90 cm.'s depth. Hence a change would seem to have taken place.

We must suppose, then, that the coffins, crosses, or dresses that are best preserved originate from burials that took place at midsummer time when the thaw had reached it's deepest level. They lay from the beginning immediately on the frozen bottom and only thawed during the warmest season every year. In this way the putrefaction of the body took place slowly and at long intervals without damaging the surrounding shroud. Later on the summer-temperature fell, and what was still left of these interments became encased in the frozen earth which also preserved those plant-roots that had had time to penetrate into these deeper layers during the summer.

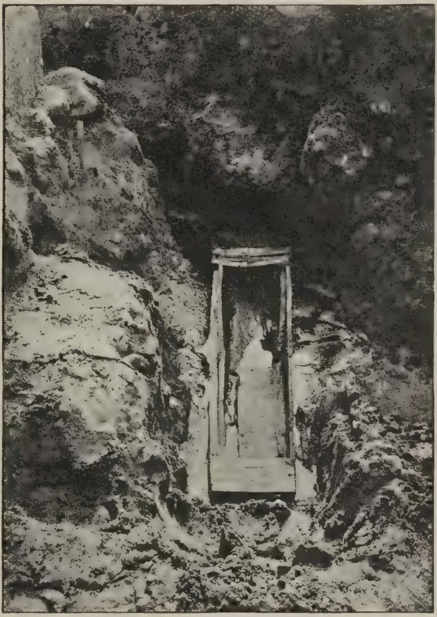

Fig. 165. Coffin No. 28, during excavation.

The finds were exhumed from greatly varying depths, but from our figures it will be seen that the state of preservation of the individual pieces was not always in direct proportion to the depths at which they were found. "Local conditions" assert their influence to a certain degree, amongst other things especially the degree of humidity of the earth in the various parts of the churchyard. But there are cases where such an explanation will not suffice, and where it is a more probable assumption that thawing at a deeper level in early times, at a higher level in more recent centuries, exerted an influence.

When a dress is found in a state of great decay and penetrated by numerous roots at a considerable depth this would be naturally explained by its being buried at an early period, while on the other hand a well-preserved dress found at an inconsiderable depth may be assumed to date from a late period.

This assumption may to a certain extent be tested by the dating of the dresses given in chapter VI, and it would seem that it confirms the correctness of our conjecture. Unfortunately the two most recent articles of dress cannot help us here. The high cap No. 87 was, it is true, found at a quite inconsiderable depth — a figure cannot be given, but it was found within the first days of the excavation, — its state of preservation, however, is not good. And in the case of the pleated dress (No. 58) both the depth of the find and the state of preservation may be called middling. On the other hand both hood No. 70 with the long thin tail and several of the hoods of the more recent type were found in good preservation at inconsiderable depths (50—55 cm.), while hood No. 68 of the earlier type was found much decomposed at a depth of 1 m. Also the open male jacket (No. 63) one of the most recent dresses, was found in good preservation as regards the material at a depth of only 42 cm. below the old surface.

Finally it should be mentioned that the dresses, which taking them altogether are more recent than the coffins and crosses, were on the whole found at higher levels than the latter.

Much light is thrown on the question by the interments found in layers above one another, when the deepest are the most decomposed. This was especially the case with Nos. 49, 43 and 60. No. 49 lay at a depth of about 65 cm. below the old surface and was so decomposed that it could not be preserved.[1] Above it, at a depth of only 55 cm. lay gown No. 43 which was perforated by roots, it is true, but the material of which was nevertheless well-preserved, and above this again, at a depth of 45 cm., No. 60, of which about the same may be said. The child's shroud No. 85, found besides No. 60, must, however, have been too near the surface (at a depth of abt. 40 cm.) to keep in good preservation.

A change in the limit of thaw here forces itself on one's notice, it seems to me, as the most obvious explanation, and from the circumstances of the find we may presumably venture to conclude that Nos. 43 and 60 are not only relatively, compared with No. 49, but also absolutely from a late date.

It may be objected that since No. 49 was found at the lowest depth and is thus the oldest, there is nothing remarkable in its decomposition being most advanced. To this we must answer that when the dresses above it have been so favourably layered that they have been preserved so little damaged for 4—500 years there is no reason to suppose that another century or two under the same conditions would essentially influence their state.

I do not consider the question here discussed definitely settled by our investigations. But it is not saying too much, I think, if we hold that weighty evidence has been brought forward to show that a deterioration of the climate and ice conditions has taken place in Greenland since the Middle Ages, and with a climate of the nature here in question even a very slight change in temperature might have the most far-reaching effects. It is reserved for future investigations to find out whether the same conditions that we mentioned above prevailed by the farms in the interior of the fiords, or whether it was only on the wind-blown headland that the increasing masses of drift-ice could influence the summer-temperature to such a degree that the ground did not thaw to the same depths as hitherto.

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[1] We point out that it was quite undisturbed by the later interments.

In future excavations it must also be examined whether other effects of a change of climate can be ascertained. We know from bones found in the kitchen-middens that the old Greenlanders kept not only goats and sheep but also cows and horses. Nowadays cattle is kept in a single place by the Eskimos, viz. on the plain where the old cathedral stood, now Igaliko, and even if horses are not kept any more, there would be nothing to prevent them thriving under the same climatic conditions as nowadays,[1]) even if there would be difficulties in procuring the necessary quantity of stable fodder. But it would be important if it could be shown that pigs had been kept — as in medieval Iceland.[2]) Hitherto, however, only a single bone of a pig has been found, a piece of a thigh-bone, showing marks of a dog's teeth, found by Mr. MOGENS CLEMMENSEN at Qagssiarssuk in the Igalikofiord.[3]) As long as no others have been found, there is of course the possibility that it may have been imported in a ham.

A milder climate in the Middle Ages must also be assumed to have manifested itself in a somewhat different flora — quite apart from the question of corn-growing. With this possibility in view the geologist Dr. K. JESSEN on his own suggestion made microscopic examinations of some small samples of soil adhering to the dresses which were, however, for the most part already washed out, to see whether there were seeds of other plants than those now growing in Greenland.[4]) This examination gave no positive result, as only such plants were ascertained which still grow in South Greenland, but it would be desirable if the experiment could be repeated with some better and larger samples. An investigation of the bog strata would also be of great interest.

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[1]) At the sheepbreeding station at Julianehaab there was a plan in 1921 of using two Icelandic horses which has perhaps now been carried out.

[2]) Edv. Bull in Geografisk Tidsskrift, vol. 23. p. 3.

[3]) MoGr. XLVII, p. 345.

[4]) A plant-seed may very well keep for centuries — this may occur in other places too where the earth is not frozen. At Herjolfsnes we even found a quite freshlooking crowberry (*Empetrum nigrum*) with one of the dresses.

Mr. K. STEPHENSEN has called our attention to the fact that there is a great number of rather thick birch-tree trunks lying at Sermilik's Tasiussaq by Julianehaab. They are all dead, and nowadays only a low copse of birches and willows grows on the spot. The author therefore raises the question whether there is any other explanation of the large birches dying off than a deterioration of the climate.¹)

Also another question which the same author touches upon is of importance in this connection. Can it be shown that the glaciers have in recent times advanced over areas which were formerly inhabited or habitable? Both in the tracts behind Julianehaab and in the interior of the Tasermiut there are said to be Norse ruins which are conspicuously near glaciers.

In the latter place there is even said to be a cemetery from the Norse period quite covered by a glacier.²)

These cases, however, need further investigation, and such an investigation ought no doubt to be made. In the Swiss Alps it has been shown that in the Middle Ages the glaciers retreated far beyond the areas within which their oscillations of movement have taken place in recent centuries. Old roads have since then become barred, forests with ancient trees have been attacked, and even the soberest climatologists see herein an irrefutable testimony to a warmer period in the Middle Ages.³)

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¹) MoGr. LI, p. 101.

²) Holm, MoGr. VI, p. 173.

³) A. Heim, Gletscherkunde (1885) p. 512. A. Norlind, Det historiska klimatet i Nord- och Mellaneuropa (Ymer, vol. 35, 1915, p. 90).

Chapter XI. Conclusion.

The Decay of the Norse Colonies in the Light of the Find from Herjolfsnes.

In 1261 the Greenland free state submitted to the Norwegian crown after an independent existence of a quarter of a millennium. The year after, the mother country, Iceland, followed this example. In both countries the act was the result of pressure from Norway whose king, Haakon Haakonsson, consciously strove to establish the Norwegian supremacy in the ocean countries west of his realm. How highly the Norsemen in Greenland valued their independence at this period, and how steadily they resisted subjection to King Haakon's will, of this we have no direct information. This one fact we know, that as early as 1247 the king sent the recently consecrated Bishop Olaf to Greenland to promote his object,[1] and that 14 years were to pass before the desired result was attained. We can hardly, I think, attribute this long period of deliberation to any other cause than a certain resistance to the king's plans.

In 1261[2] three visitors to Greenland, Odd of Sjoltar, Pall Magnusson, and Knarrar-Leif[3] returned to Norway after an absence of four winters. They brought with them the first tidings of the colonists having agreed to pay taxes and fines for manslaughter to the king. The Greenlanders could hardly have permitted themselves an absolute rejection of the king's claims, nor would it have been to their interest seeing in how great a degree they were already dependent on Norway.

The colonies in Greenland were founded by settlers from Iceland, and the close connection with the mother country was kept up very long. In the 12th and 13th centuries the bishops of Greenland again and again paid visits of shorter or longer duration to Iceland,[1]) and one of the last fully reliable documents attesting the connection between Europe and the Norsemen in Greenland is a marriage certificate dated 1408, issued by the deputy bishop in Greenland, Sira Eindride Andresson, and the priest Sira Pall Halvardsson. Herein they testify that they have married, in Hvalsey Church in Greenland, the prominent Icelander Thorstein Olafson to Sigrid Bjørnsdotter, a woman living in Greenland, herself related to noted Icelanders.[2])

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[1] Haakon Haakonsson's Saga, chapter 257.

[2] Ibid. chap. 311.

[3] So called from the merchantman ("knar") he owned.

But in spite of the apparently close connection between Iceland and Greenland evidenced by this accidentally preserved document, direct intercourse had early been established between Norway and Greenland. When the archiepiscopacy was set up at Nidaros in 1152, the church in Greenland was laid under the Norwegian church, and this became of great importance. Moreover the Greenlanders had especially to look for commercial connection with Norway, not with Iceland, for the very good reason that Iceland herself lacked the greater part of the commodities which the Greenlanders needed, especially timber, and corn for beer and bread. Iron was produced in Iceland but no other metals.

This trade connection was no doubt a source of benefit and gratification to both parties, for the goods which the Greenlanders could offer the Norwegian traders were much in demand, both the valuable skins, the stout leather thongs made of walrus hide and finally, above all, the walrus tusks which were an excellent substitute for ivory and could only be had from Greenland[3]).

But despite the mutual advantages of the connection it may, I think, be maintained that the Greenlanders had become economically dependent on Norway long before the political dependency was established. For the intercourse with Norway was kept up almost exclusively by Norwegian traders. The Greenlanders themselves undoubtedly lacked large seagoing merchantmen. Boats they had no doubt in plenty for the important seal hunting in the waters north of the settlements ("Nordrsetur"), but only as a rare exception can they have had any large ships. Such ships were perhaps owned by the first generations of colonists, but not by their descendants. The percentage of losses was too high and the purchase of new vessels almost impossible.

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[1]) See especially the extracts from the Icelandic annals in GHM III.

[2]) GHM III p. 144 seq. Nansen (Nord i Taakeheimen p. 377) confuses Thorstein Olafson with another Icelander, Thorstein Helmingsson, who was in Greenland at the same time, as he had been beaten off his course and come to that country on a voyage from Norway to Iceland.

[3]) Trade in these regions was no doubt in the main confined to barter, and hitherto no medieval coin has been found in Greenland, though money was hardly quite unknown. At any rate a small weight of brass of 25.25 gr. (abt. 1 Øre old coinage) almost similar in shape to fig. 45 in W. A. Brøgger's "Ertog og Øre", was found at Tasermiutssiak in the Tasermiutfiord. It belonged no doubt to a balance for weighing coins (given me by the late Isak Lund at Nanortalik). At Sukkertoppen was formerly found one of the small brass horses (weight 46.97 gr. or abt. 2 Ører old coinage) which are supposed to be weights from balances for coins from the time of Haakon Haakonsson (W. A. Brøgger p. 87 seq.) Cp. fig. 166.

To the Greenlanders this question of tonnage soon became very critical. For in Norway, too, shipping was plainly on the wane in the 13th century, at any rate in its latter half, when the period of Hanseatic domination in trade began. Under these circumstances the communication of the Greenlanders with the outer world became uncertain, and if we want to understand what happened in 1261 when the Greenlanders gave up their independence, it will be well to remember how important it was to them to make sure of a mercantile connection with Norway and how for that very reason they were obliged to submit to the Norwegian claim of political supremacy. It may with great probability be assumed that the Greenlanders, as well as the Icelanders[1]), in their treaty with the Norwegian crown obtained a formal promise of a regular shipping connection, how often we do not know, but they have hardly been exacting in their demands. If the Greenlanders secured the promise of one visit annually even this may only have been a programme which was not put into practice.

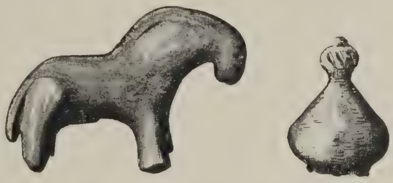

Fig. 166. Two medieval brass weights for weighing coins, found in Greenland.

It is thus, as pointed out by Professor Edv. Bull, due to a misconception of the historical facts when it has frequently been asserted that the surrender of independence in 1261 initiates the decline of the Norse colonies[2]). For the small community it means, if anything, a certain consolidation, and we must assume that the Greenlanders were, especially at first, benefited by the union with Norway, though, of course, it would have been more to their advantage if Norway had not herself been facing a period of decline at the time.

The Norwegian monopoly of trading to Greenland and other tributary countries, which was established at the close of the 13th century, must be understood as an inevitable consequence of the obligation contracted by Norway to keep up a shipping connection with Greenland. The skippers of the crown or the traders to whom the king transferred the monopoly could not undertake the expensive and dangerous voyages if they might risk that other merchants or casual traders to Greenland had acquired the commodities which they set out to purchase, and which were to repay their long voyages. As events developed in Norway it is exceedingly doubtful whether more vessels had visited Greenland if it had been an open country. At any rate no one would then have been under an obligation to do so.

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[1]) In their treaty with King Haakon Haakonsson it says: Item at sex hafskip gangi til landzins a hveriu are forfalla laust. "Norges gamle Love" I p. 461.

[2]) Edv. Bull, Grønland og Norge p. 27 (Reprint from the year-book of the Norwegian Geographical Society XXXI—XXXII).

We have but scant information about the nature of the monopoly. Something we learn from a lawsuit, dating from 1389,[1]) against some persons who were charged with visiting Greenland and illegally carrying on trade there. They were, however, acquitted, since they could swear that they had only landed in Greenland owing to stress of weather and had not made free with the property of the crown, while the Norwegian functionary at Bergen *(fehirde)* who dealt with the case could confirm that they had paid the imposts due *(sekkjagjald)* both on their goods from Greenland and from Iceland.

A special permit to enter the country seems to have been required, and the crown had an official *(umbodzmaðr)* in Greenland, who bought up the products of the country and sent them home as soon as an opportunity presented itself, either in a ship belonging to the crown or in such as had a charter from the king. When this functionary had purchased what he wanted, it would seem that traders who had lawfully entered the country were allowed to buy goods from the inhabitants, provided they paid the legal dues on their arrival at a Norwegian port.

A case of this kind gives one the impression that the Greenland trade was subject to rather hampering restrictions. The Greenlanders were dependent not only on the goodwill of the crown but also on its power to fulfil its obligations. But even if it cannot be denied that this power grew more and more restricted in the course of time, and this circumstance became fatal, it would seem, nevertheless, that modern historians of the Norse colonies have exaggerated the proofs of a decline in the trade intercourse with Europe in the 14th century, just as we must assume other reasons for the discontinuance of navigation to Greenland than the decrease of Norwegian active trade and the decline of the royal power in Norway.

When so much stress is laid on the long intervals asserted to have occurred in the navigation to Greenland in the 14th century, the frequency of the sailings in earlier times has evidently been exaggerated. When the actual period of colonisation was over, and when that time had gone by, too, when the Greenlanders themselves possessed large seagoing vessels, it is not very likely that they should have been visited by ships from Europe every year. We have, at any rate, no positive proof that such was the case. The voyage from Iceland was certainly not so very difficult, but direct communication with Norway for trading purposes was so dangerous, so expensive, and so troublesome that it is hardly to be supposed that it could have been attempted every year. A really profitable trade voyage could moreover hardly be accomplished within a year, especially in earlier times when there was not, as later on, a functionary in the country who could shorten the stay of a vessel by buying up the goods beforehand from the Greenland producers.

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[1]) GMH III 139 seq.

In an oft-quoted letter dated 1308¹) Bishop Arne of Bergen tells his colleague Bishop Thord of Gardar in Greenland of the sad events that have occurred within the last ten years, of the death of king Eric in 1299, of Bishop Narve of Bergen in 1300, and of Bishop Thorstein of Hamar in 1304 — "whether or not you have heard of them before," he certainly adds. This letter makes us vividly realise in what remoteness and isolation the Greenlanders lived. It is something similar when the archbishop in 1343 consecrates a new bishop of Greenland and learns later on that the old one is still living in the best of health and spirits at Gardar,²) or when an Icelander in 1406, on his return voyage from Norway was thrown off his course and came to Greenland where he stayed for four winters, so that his wife at last married again thinking he was dead.³) But however instructive such facts may be, it does not of course preclude that events of a similar nature may have happened in former periods. Even in so early a source as the King's Mirror we are told that people rarely visit this country *(þangat fara sjalldan mænn)*. The communication with Europe was always irregular, sometime there would be intervals of several years, especially after a ship had been lost, at other times there would be annual sailings.

From the period about the middle of the 14th century we have repeated statements that the king's ship, the "knarr" sailed to Greenland in certain years, but we have not the least ground for assuming that this information is exhaustive, and we cannot infer from the silence of the sources on this point that no vessels sailed all the other years. For such an assumption the knowledge handed down to us is too fragmentary and casual.

Various accounts stating that the Greenlanders were becoming dechristianised and adopting the religious beliefs of the Eskimos have by some been taken as positive evidence of increasing slackness in the intercourse with Norway. One of these accounts, referred to the year

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¹) GHM III 94 seq.

²) GHM III p. 14. He did not die till 1348.

³) GHM III p. 40.

1342,[1]) has only been transmitted to us in Bishop Gisle Oddson's annals dated 300 years later. Its testimony cannot, however, be rejected for that reason alone, as it may very well be based on earlier tradition, but the late source in which we find it justifies sharp criticism. When it says that "the inhabitants of Greenland voluntarily abandoned the true faith and Christian religion and turned to the people of America",[2]) this statement, if it is not due to an entire mistake, can at any rate only hold good for the Western Settlement which seems at that time to have been in disintegration. In the general sense in which it is applied it is quite unacceptable. In the Eastern Settlement Arne was at that time bishop. The Norwegian priest Ivar Baardson had also arrived in the country and in the description of the settlement which was taken down from his communications he does not with one word mention apostasy, and finally various statements from the following time show that Christianity still prevailed. In 1407 a man by the name of Kolgrim was burnt for practising sorcery, and in 1408, after due publication of the banns, a marriage was solemnised at Hvalsey Church (Qaqortoq) at which the bishop's deputy and the parish priest officiated and about which they issued a parchment (above p. 246).

Another account dates from 1355, when King Magnus Smek in a letter, of which only a very bad version is preserved, however,[3]) appoints Poul Knudson captain of the "knarr", the ship that is to sail to Greenland because Christianity is in danger there.[4]) It is not clear whether this royal letter, which bears the seal of the Lord High Constable, only orders a merchantman to be sent out, or whether a sort of military expedition was intended. In either case it would be a most remarkable way of correcting a tendency to apostasy. One would think it would have been better to send out some priests and above all a new bishop since the old one had died in 1348. But the country got no new bishop until 1368.

The question dealt with in Magnus Smek's letter is, whether Greenland is to be in the hands of Christians or heathens, and the direct cause of the sending of the ship was presumably the sudden descent of the heathen Eskimos on the Western Settlement by which the Norse

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[1]) GHM III p. 459. Cp. G. Storm in Arkiv för nordisk Filologi VI p. 355 seq. Nansen, Nord i Taakeheimen p. 364.

[2]) The latter expression (ad Americæ populos se converterunt) we may perhaps with Nansen, though not without great philological scruple, take to mean that they were converted to the beliefs of the Americans (i. e. the Eskimos).

[3]) Copenhagen Royal Library (GKS 2432 4to), reprint in GHM III p. 121.

[4]) "Bede vi at de annamme denne vor befaling rett god villie for sagen, at vi gøre det i hæder til gud oc for vor sjels oc forældres skyld, som udi Grønland haver (stiftet) kristendom oc ophold til denne dag oc vil end ei lade nederfalle om vore dage".

Christian population seems to have been entirely exterminated, an event which is also mentioned by Ivar Baardson[1]) and which must have occurred during these years.

We shall by no means deny that the sailings to Greenland became less frequent after the middle of the 14th century. It is a characteristic trait that the bishops of Greenland now rarely stay in that country,[2]) and after the beginning of the 15th century never even visit their diocese. We have here only laid stress on proving that the usual account given of the tragic course events took in the 14th century contains considerable exaggerations, and will not bear criticism of the historical sources. To this may now be added the positive proofs against it which may be drawn from the find at Herjolfsnes.

Such an archæological find in my opinion possesses considerable evidential force when we are trying to form an estimate of the general state of culture of a period. We have seen that the majority of the objects discovered belongs to the 14th century, and in the case of the costumes most certainly to the latter half of the century.[3]) We have seen that the dresses imitate the European fashions of the time which were of course simplified but otherwise hardly even adapted to local conditions. And similarly, the other objects are formed after European models and represent a pure and unmixed European culture.

We may further assert that the dresses from Herjolfsnes on the whole belong to a higher social level than the ordinary dresses of the common people which we know from European representations.[4]) On the whole neither dresses nor other objects bear the stamp of a culture that is degenerating into barbarism. If we subject the dresses to a close examination, we are astonished at the amount of careful labour bestowed on them[5]) and the experience embodied in the cut of such an article of clothing. This we have shown in detail in chapter VI. Also the wooden objects may be designated as "tidy work" which amply attests that the inhabitants have been in possession of first class tools, so sharp and exact are the incisions. This is not without significance, for it would be exactly in the domain of tools that a less frequent connection with Europe would first be apt to show itself.

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[1]) MoGr. XX p. 328. The terms employed are somewhat vague, it is true, but when it says that the Eskimos were in possession of the entire Western Settlement this can hardly be interpreted otherwise than to mean that the Norsemen were exterminated. (For an opposite view see Nansen, Nord i Taakeheimen p. 369 seq.).

[2]) In the period from 1201 to 1250 Greenland was without a resident bishop for 24 years, from 1251 to 1300, for 18 years, from 1301 to 1350 only for 8 years, but from 1351—1400 for 40 years.

[3]) Such a dating is of course only a terminus post quem. The dresses may have been worn and laid in the grave much later.

[4]) This is further confirmed by the difference in the quality of the dresses. While a patched gown like No. 43 with its coarse hood is the dress of a servant, a dress like No. 38 must have been worn by the wife or daughter of a wealthy farmer.

[5]) They form a striking contrast to the gown from Kragelund bog mentioned above (see fig. 84). Not only is this quite simple in cut, but it is also very carelessly made. Such were the dresses of the “common people”.

Against the above-mentioned assertion that the Norsemen should have abandoned the Christian faith in the 14th century, we must advance the evidence offered by the find from Herjolfsnes, that the Christian burial customs, at any rate, were observed here with a conservatism and faithfulness hardly exceeded anywhere in Europe. It will of course always be a matter of opinion how far we are to attribute importance to evidence drawn from so restricted a domain as the burial customs. Possibly this question in conjunction with others will by some unexpected chance be more thoroughly sifted in later archæological researches but there seems no prospect of our ever getting the chance to search the hearts of the old Norsemen in religious matters.

So much, however, we may venture to assert without hesitation, that the find gives us the impression of a community which, throughout the 14th century, in spite of the hard conditions of life which must always have prevailed, and which set their mark on the race, was to a certain extent prosperous and in good contact with Europe. This being so, the probability that the Norwegian trade monopoly which was introduced already before the beginning of the 14th century should have caused the extinction of the Norse colonies is greatly lessened. The causes must have been of another kind. The weakening of the Norwegian political community after the middle of the 14th century, caused by internal and external events, must no doubt be reckoned with as one of the most essential factors. In 1349 Norway was ravaged by the terrible plague which then passed like a scourge all over Europe, and Bergen especially, the main seat of the Greenland trade, was harried without mercy. In 1393 Bergen was burnt down by the Germans. But in addition to this I must here again call attention to the problem discussed in the preceding chapter. If the theory of a deterioration of the climate and ice conditions in Greenland at the close of the Middle Ages holds good — and the excavations at Herjolfsnes may, I think, be said to have strengthened this theory considerably — we shall therein find a very natural reason why the sailings to the country became less and less frequent and at last entirely ceased. Such great natural obstacles were encountered, and such considerable losses sustained, that navigation to Greenland had to be given up.

Early in the 15th century the tragic emergency of the unhappy Norsemen in Greenland probably set in — and it deserves to be mentioned that it was just at this same period that the English disrupted the monopolised trade to the Norwegian dependencies and appropriated especially the trade to Iceland. A vivid picture of conditions during this late time is drawn in a succeeding section of this volume by Professor F. C. C. Hansen on the basis of an examination of the skeletal remains found with the dresses. Without entering upon the details of the valuable information gained by this anthropological and anatomical investigation, I shall here only state the general result that the last Norsemen at Herjolfsnes were a degenerated race doomed to destruction. Lack of infusion of fresh blood was no doubt an essential factor, and the conditions of life were of such a merciless nature that, instead of hardening the race, they wore it out. To this was at last added actual under-nourishment which gave it the death blow.

But what was the cause of that under-nourishment which enervated the Norsemen in Greenland? The absence of imported food from Europe — i. e. especially corn — was hardly the direct cause, for however coveted it was, it is not very likely that bread ever became a regular component of the diet of the Norsemen in Greenland. Even in the earliest times the connection with Europe was presumably so uncertain that the colonists could not well rely on imports alone, and we have the statement in the King's Mirror to show that in the 13th century "most of the Greenlanders did not know at all what bread was".[1])

In other ways, however, the cessation of navigation to Greenland must have been fatal. There was now no possibility of the replacement of cattle that perished during severe winters, and only small possibility of procuring new boats (by means of drift timber). And if in connection with the increasing ice-packings along the coasts we may reckon with a deterioration of the climate rendering the keeping of cattle extremely difficult — and the rare cultivation of corn quite impossible — and forcing down the conditions of life below the most modest possibilities of existence for Europeans, we shall understand how the race succumbed.

As regards the point of time when communication with Europe was broken off great uncertainty prevails. The written evidence of news from Greenland which has reached Europe becomes very scarce in the 15th century and is of a nature to inspire little confidence. In 1410 three Icelanders who had made a four years' stay in Greenland obtained a passage to Norway and thence to Iceland, but this is the last unquestionable information we have of communication by ship between the Norse colonies and Europe. As now it is furthermore expressly mentioned in a papal letter of 1492 that for the last 80 years no European vessel is thought to have visited Greenland,[2]) it will easily be understood that modern critical historians arrived at the assumption that intercourse with the Norse colonies was broken off about the year 1410.

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[1]) See above p. 230.

[2]) Norsk Historisk Tidsskrift 3. R. II p. 399 seq.

This assumption must, however, be given up now, since the discoveries at Herjolfsnes have quite invalidated it. We have seen that the majority of the dresses belong to the second half of the 14th century, and in good accordance with historical tradition there seems to be a line of demarkation exactly at the period of 1400, in so far as the European fashions from the 15th century do not seem to have been so extensively introduced among the Greenlanders as the earlier fashions. But they are not entirely absent. The ample coat, open in front with a low stand-up collar — which occurs in two specimens (Nos. 63 and 64 above) — was so fashionable in Europe abt. the year 1400 that we can hardly suppose it reached Greenland before 1410. The round cylindrical caps, too, presumably belong to the costume of the 15th century. A dress like No. 58 with the neck cut down in a point and pleats sown in at the waist must be referred to the middle of the 15th century, and the high conical cap No. 87 even to a slightly later period (the latter half of the 15th century). The two latter articles especially are so characteristic and definite in date that their evidence cannot be explained away. Finally we shall call to mind the shard of a Rhenish stoneware ewer (No. 168) which is also of a type manufactured in the 15th century (probably in the first half of the century).

Taken all together these articles prove that the inhabitants of Herjolfsnes were in communication with Europe, if ever so little, throughout the 15th century. That it was the "knar" of the Norwegian king that visited the country we need not therefore assume. It may, as so often before, have been traders to Iceland who had been beaten off their course, probably Hanseatic or rather English merchants who had voluntarily or involuntarily landed in Greenland on their way to Iceland after dried fish. They may then have traded surreptitiously with the inhabitants and have not felt tempted to reveal it. Finally we have the somewhat vague statements from the latter half of the 15th century about the Icelandic governor Didrik Pining who is said to have carried on trade with the Greenlanders in conjunction with Pothorst,[1]) and who is supposed to have been sent on an expedition to Greenland by the Dano-Norwegian king Kristiern I.[2]) It seems more probable though that Pining and Pothorst's trade connection was with the Eskimos.

For the elucidation of conditions among the Norse in Greenland in the 15th century, we shall here emphasise one small but very significant observation made during the excavations. The above-mentioned shard of a Rhenish stone ewer (No. 168), which as we saw must have wandered the long way from the neighbourhood of Cologne to Herjolfsnes some time in the 15th century, was found at a considerable depth by the foundations of the best built (but hardly the latest) wing of the dwelling-house (p. 54 above). It lay below the old surface and was most probably thrown away during the erection of the building in question which according to this cannot then be earlier than the 15th century. It would be highly remarkable if really such extensive building operations should have been undertaken at so late a date and have been so well carried out.

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[1]) Memorandum in an old English account-book from the Faroe Islands, reprinted in Purchas his Pilgrimes Part 3 p. 520 (London 1625), cp. GHM III p. 479.

[2]) Louis Bobé in Danske Magasin 5. series VI, p. 310.

It now remains to discuss the question of how relations between the Norsemen and the Eskimos developed.[1] If the drift-ice was on the increase outside the coast of the Eastern Settlement at the close of the Middle Ages the prospects of sealhunting in these areas would certainly improve much. This may be supposed to have been one of the main causes why the Eskimos migrated southwards. As early as the middle of the 14th century we have, as already mentioned, Ivar Baardson's statement that the Eskimos ("Skrælingerne") had settled down in the Western Colony and probably exterminated its Norse inhabitants. According to the Icelandic annals[2]) they made raids in 1379 on the Greenlanders, i. e. presumably the Norsemen in the Eastern Colony, where they killed 18 men and captured two boys whom they made their slaves.

Thus relations between the two peoples did not apparently develop peacefully. It is not very likely that they settled their differences in regular battles, more probably there were feuds, and these more or less local feuds were interrupted by intervals of peace[3]) in which the Norsemen stayed on their farms in the interior of the fiords, while the Eskimos in their huts on the extremest headland watched the migrations of the seals. In his book "Nord i Taakeheimen" the famous Norwegian arctic explorer Dr. FRIDTJOF NANSEN has vehemently disputed the assumption that the Eskimos should have exterminated the Norsemen under the plea that the Eskimos nowadays are of an extremely peaceful and goodnatured disposition. However, the Eskimos have now had no enemies for centuries, so their warlike tendencies have not been encouraged, while we may venture to assume that the old Norsemen were anything but peaceful neighbours to them, and even in the period of their degeneration did not lack the inclination to provoke a quarrel.

According to Dr. Nansen's theory, which is endorsed by Dr. BJÖRNBO and Professor Edv. Bull, after the connection with Europe was broken off the Norsemen, forced by circumstances, gradually adopted Eskimoic manners and customs and mixed with this people. I see very well that this hypothesis may be tempting, but we lack all positive proof of it.

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[1] Cp. F. Jónsson & H. Pétursson: Um Grænland (1899), p. 42 seq.

[2]) Gottskalk's annall from the latter half of the 16th century GMH III p. 32. Icelandic Annals edited by G. Storm (1888) p. 364.

[3]) This is attested by Bjørn Jorsalfar's account, mentioned p. 256.

In the preceding pages we attempted to show that the supposed evidence from the 14th century of the apostasy of the Norsemen and their conversion to Eskimoic beliefs and ways of living did not at any rate hold good for the Eastern Settlement where disintegration cannot possibly have been so advanced at so early a date.

Bjørn Jorsalfar's account of his stay in the Eastern Settlement from 1385 to 1387,[1]) during which time he was appointed judge and revenue officer (*syslumaðr*) for the district of Eriksfiord, contains the interesting statement that at this time there were Eskimos living near the settlement. From the farmers he received no less than 260 legs of mutton as his dues (*gjaftollr*), while two Eskimos whom he had rescued from drowning hunted for him. That they were superior to the Norsemen in this domain is extremely probable. The Norse, however, subsisted by cattle-breeding, and nothing in this account indicates that they should have adopted Eskimoic customs.

Finally a much later source of information has been adduced in favour of Nansen's theory, viz. the papal letter of 1492 (p. 253, note 2) occasioned by a monk Mathias having applied for the post as bishop of Greenland and having declared himself willing to go in person to the country to convert the apostates. This letter contains reliable information about conditions in Greenland, amongst other things about the ice conditions. The fear of apostasy on the part of the Greenlanders is not, however, based on any positive knowledge, but only on the, as we have seen not quite correct, assumption that there had been no communication with Greenland for 80 years, and that neither bishops nor priests had been sent out to the country during all that time. The mission of Mathias has been supposed to have been occasioned by recently received news from Greenland, but this does not appear with certainty from the letter, as Nansen, too, has pointed out (l. c., p. 380).

If thus we have no positive evidence of a fusion of Norsemen and Eskimos, it must on the other hand be admitted that the proofs of hostile relations between the two peoples are not undeniable either, apart from the two abovementioned statements from the 14th century,[2]) partly in Ivar Baardson's account, partly from 1379. A papal letter of

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[1]) GHM III p. 436 seq.

[2]) Even Bjørnbo admits the validity of these two testimonies (MoGr. XLVIII p. 11).

1448¹) to the two bishops of Iceland is especially open to doubt. It refers to news which is said to have reached the pope regarding an Eskimoic attack on the Norse (i. e. the Eastern Settlement), of whose parish churches only 9 were supposed to have been left, while many of the inhabitants were taken as slaves. Dr. Nansen has pointed out the improbability of this latter statement, and probably he is right in his criticism, though we must remember that, in the account of the attack in 1379, too, it is mentioned that the Eskimos carried away two boys as slaves.

In the account of Pining and Pothorst's voyage to Greenland in the time of Kristiern I (see above p. 254) "the Greenlandish (i. e. Eskimoic) pirates" are mentioned, "who with many small flat-bottomed boats attack the other vessels in great number", and also in other authors of the 16th century do we find a similar conception of the not very peaceful disposition of the Eskimos.²) Finally, in Eskimoic legend we find tales of the extermination of the last Norsemen which are antagonistic to the view that a fusion of the two peoples took place.³) Unfortunately these tales are not quite reliable, as they were not written down until the 19th century, and we cannot be sure that they were not influenced by the European interrogators.

It must thus be admitted that historical tradition furnishes no conclusive proof either of the usual conception that the Norsemen were exterminated by the Eskimos or of Dr. Nansen's theory of a fusion between the two peoples. We must then inquire whether archæology cannot give us more definite indications. It will no doubt be archæological researches which will finally solve this problem. They are as yet in their inception but hitherto they do not support Dr. Nansen's theory. In the excavations at Herjolfsnes, a single object was found indicating not a mixture, but contact between the two peoples. This is the whalebone box mentioned under No. 197. It corresponds entirely to the familiar Eskimoic whalebone boxes, and it is reasonable to suppose

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¹) Dipl. Norveg. VI No. 527. GMH III p. 165 seq. Nansen, Nord i Taakeheimen p. 373 seq. It must be admitted that this papal letter is open to criticism. It is addressed not to the two bishops actually in function at Skalholt and Holar, but to two German impostors, Marcellus and Mathæus, who had tricked the pope into consecrating them as bishops of Iceland. The letter contains nothing to show that the news stated to have been received by the papal chancellor's office about conditions in Greenland proceeds from the addressees themselves, but it cannot be denied that the circumstances invalidate the statement in the letter. In itself it is not more fantastic than the trustworthy information from the North has often become in the version of the papal clerks, but on the other hand it has not on any point any genuine Greenland "colouring" which might inspire confidence in it.

²) Nansen, Nord i Taakeheimen, p. 384 and p. 372 note 1. Danske Magasin 5. ser. VI. p. 314.

³) Cp. Dan. Bruun, The Icelandic Colonization p. 144 seq.

either that it originated from the Eskimos or that the Norsemen became acquainted with the type from them (hardly the reverse). It was found in a grave with a small object of pronounced Norse origin, a small wooden pommel with the owner's mark carved in it (No. 200). This unique specimen seems to me to strengthen the impression of an intact Norse culture rather than otherwise. It shows, presumably, that the inhabitants of Herjolfsnes were in fact in contact with the Eskimos, while at the same time all the rest of the find, as we have already mentioned several times, proves that the European culture of the Norsemen was not influenced by this occasional intercourse.

Finally we must refer the reader to the results of the anatomical investigation which are not the least decisive in this respect. They show a degenerated race, a race that has become isolated and has succumbed, not a race produced by intermixture. Such a race would at any rate hardly have suffered from want of nourishment. Developments within the last centuries have shown that crosses between Europeans and Eskimos thrive exceedingly well.

The question of how the last Norsemen in Greenland came to their end after the separation from Europe has occupied the thoughts of many people during the past centuries. As regards Herjolfsnes we may at any rate say that we are now in possession of some positive evidence. But in how far conditions in this place apply to the rest of the colony is of course problematic. However, since we may now be sure that the Norse were in touch with Europe throughout most of the 15th century, we involuntarily feel inclined to give more credit to the latest accounts about the Norsemen which otherwise we should be apt to refer to the world of myth.

To these accounts which, bearing in mind conditions at Herjolfsnes, we ought perhaps to look upon with less sceptical eyes, belongs an account written in 1625 by the noted Icelandic author Bjørn Jónsson of Skardsaa.[1]) It deals with an Icelander named Jón Greenlander who within "living memory" had related how he had once been blown off his course and come to Greenland onboard a German merchantman. According to computation it may be assumed to have occurred abt. 1540. The ship entered a fiord with many islands. Several of them were inhabited (probably by Eskimos). These they dared not, however, approach, but went ashore on a small uninhabited island where there were boathouses and stone walls quite like those in common use in Iceland. "There they found a dead man lying prone. On his head he had a well-made hood, his other clothing being partly of frieze partly of sealskin. By his side lay a bent sheath-knife much worn and wasted by repeated whetting. This knife they took away with them as a souvenir".

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[1]) GHM III p. 513 seq.

It is hard to know how truthful a witness Jón Greenlander was, but his account bears throughout the stamp of credibility. It represents to me a most tragic picture of the end as I believe we must most probably imagine it. The last Norseman, clad in a dress like those now found at Herjolfsnes, lying dead and unburied by his desolate and deserted dwelling and holding in his hand the emblem of the cultural superiority of the European, the iron knife which had been ground and ground to the extreme verge of possibility. And when that verge was reached the European succumbed and the hardy Eskimos, the small Arctic race adapted to the physical conditions, took possession of the land by the right of the strongest.

GENERAL VIEW OF THE POSITION OF THE FINDS IN RELATION TO EACH OTHER

co = coffin
dr = dress
hd = hood
ca = cap
ho = hose
cr = cross

The figures given are the numbers of the finds.

Nos.	found with	found above	found below
co2	cr165		
»11			dr56
»12		co19	
»13	cr163		
»15	dr61, cr154	co20, 21	
»19			co12
»20		co21	co15, dr61, cr154
»21			co20, 15, dr61, cr154
»26	cr111		
»27	cr112, 136		
»28	cr153		
»29	cr138		
»30	166		
dr34		hd72	
» 35		hd68, ho93, cr119, 134	
» 38			dr47
» 39		hd77	hd78, 80, ca86
» 40	ca83	cr137	dr63
» 42			dr58
» 43	hd76	dr49, cr151	
» 45	ho88	hd79	dr46
» 46		dr45, ho88	
» 47		dr38	
» 48		hd81	
» 49	cr151		dr43, hd76, dr60, ca85
» 51		dr52	hd71
» 52			dr51, hd71
» 54	ca84, cr159		
» 55		cr123	
» 56		co11	

Nos.	found with	found above	found below
» 58		dr42	
» 60		dr43, hd76, dr49, cr151	
» 61	co15, cr154		
» 63		dr40, ca83, cr137	
» 64	cr160	hd67, cr145, 141	
hd67		cr145, 141	dr64, cr160
» 68		ho93, cr119, 134	dr35, hd74
» 69	cr164		
» 71		dr51, 52, cr129	
» 72			dr34
» 74		hd68, ho93, cr119, 134	
» 76	dr43	dr49, cr151	dr60, ca85
» 77			dr39, hd78, 80, ca86
» 78		dr39, hd77	
» 79			dr45
» 80	ca86	dr39, hd77	
» 81			dr48
ca83	dr40	cr137	dr63
» 84	dr54, cr159		
» 85		dr43, hd76, dr49, cr151	
» 86	hd80	dr39, hd77	
ho88	dr45		dr46
» 93			hd68, dr35, hd74
cr111	co26		
» 112	co27, cr136		
» 119			hd68, dr35, hd74
» 123			dr55
» 129			hd71
» 134			hd68, dr35, hd74
» 136	co27, cr112		
» 137			dr40, ca83, dr63
» 138	co29		
» 141			cr145, hd67, dr64, cr160
» 145		cr141	hd67, dr64, cr160
» 151	dr49		dr43, hd76, dr60, 85
» 153	co28		
» 154	co15, dr61		
» 159	dr54, ca84		
» 160	dr64	hd67, cr141, 145	
» 163	co13		
» 164	hd69		
» 165	co2		
» 166	co30		

LIST OF THE FINDS

An asterisk after the numbers indicates that the piece in question is not preserved, a cross that it does not originate from the excavations in 1921 but has been brought home on a former occasion. In the columns to the right are registered 1°: the depth (in cm.) below the old surface at which the pieces were found 2°: their state of preservation (1 indicates good, 2 middling, and 3 bad condition). The Roman numerals refer to the two following sections of this volume, A indicates the anatomical (anthropological), R the runological paper.

		Depth	Condition
1.	Deal plank with groove and tongue at the long sides, probably from the chancel gable: 45. 46. — fig. 31	80	2
2*.	Coffin of wood for an adult: 72. 73. 74. — figs. 44. 45	55	3
3*.	Ditto: 49. 72. 73. — figs. 44. 45	65	3
4*.	Ditto: 72. 73-74. — figs. 44. 45	100	2
5*.	Ditto: 72. 74. — fig. 45	60	3
6*.	Child's coffin: 72. 74	40	3
7*.	Ditto: 72. 74	40	3
8*.	Ditto: 72. 74	40	3
9*.	Coffin for an adult: 72. 74-75. 239-240. — figs. 162-163	60	3
10*.	Child's coffin: 72. 75. 239-240. — fig. 163	35	3
11*.	Coffin for an adult: 72. 75. 123	135	2
12*.	Child's coffin: 72. 75. 77	100	2
13*.	Child's coffin, incomplete, found together with a fragment of a cross (No. 163): 72. 76	115	3
14*.	Coffin for an adult: 72. 76. 222	100	2
15*.	Child's coffin, containing a small sleeve-less frock (No. 61) and a carved cross (No. 154): 69. 72. 76. 77. 127	85	2
16*.	Ditto: 72. 76	100	3
17*.	Ditto: 72. 76	100	3
18*.	Ditto: 72. 77	90	2
19*.	Coffin for an adult, made without bottom, and containing a brown woollen cord (No. 97): 72. 77. 89	120	2
20*.	Ditto, containing a fragmentary cross: 72. 77	115	2
21*.	Child's coffin: 72. 77	130	2
22*.	Coffin for an adult: 46. 72. 77	100	2
23*.	Ditto: 46. 64. 72. 78	100	2
24*.	Child's coffin, found on the top of No. 23: 64. 72. 78	75	2
25.	Coffin for an adult, partly tied together with whalebone fibres: 71. 72. 78. — fig. 46	95	1
26.	Ditto, tied together with whalebone fibres. Carved ornaments on the foot-piece. Contained a wooden cross (No. 111): 46-49. 70. 71. 72. 78-81. — fig. 32	100	1

		Depth	Condition
27*.	Ditto, joined together with whalebone fibres. On the lid a runic cross (No. 136) and inside the coffin another cross (No. 112): 70. 71. 72. 81. — figs. 47. 48.	110	1
28.	Ditto, ornamented with a kind of chequered or lozenge pattern. Contained a wooden cross (No. 152): 72. 81. 224. — figs. 49. 165	120	1
29*.	Ditto, containing a wooden cross (No. 138): 72. 82. 240. — figs. 50. 164	75	1
30.	Ditto, containing a wooden stick with runic inscription (No. 166): 62-63. 70. 71. 72. 82-84. — figs. 30. 40. 51. 52.	100	1
31†.	Fragments of a coffin found in 1880 by G. Holm: 70. 84-86.		
32†.	Child's coffin found in 1900 by G. Meldorf: 70. 86.		
33†.	Male gown, exhumed by O. Kielsen in 1840: 18. 92. 95. 96-97. 139. 140. 147. — figs. 58. 59. 60. 61.		
34.	Gown, probably female, found in a very bad condition: 97-98. 147. 160. — (A XIX)	55	3
35.	Remains of a male(?) gown, badly preserved: 99. 138. 147. 157. — (A XXV)	98	3
36*.	Remains of a shroud (female gown?) that could not be conserved: 99. 139. — (A XII)	78	3
37.	Parts of a male gown: 88. 95. 99-100. 119. 138. 140. 147. — figs. 60. 61. — (A XXIV)	62	2
38.	Long-sleeved woman's dress: 95. 100-103. 138. 139. 140. 145. 251. — figs. 58. 59. 62. 63. 70. 86. — (A II)	70	2
39.	Short-sleeved woman's dress: 30. 87. 92. 95. 103-105. 106. 138. 139. 140. 142. 163. 164. 167. 174. 182.—figs. 58. 59. 64. 68. — (A I).		
40.	Parts of a dress with cap (No. 83), probably male, but containing skeletal remains of female character: 95. 105. 128. 138. 140. — (A XX)	65	2
41.	Long-sleeved man's dress, with buttons for the sleeves: 89. 92. 95. 106-108. 138. 139. 140. 145. — figs. 43. 58. 59. 63. 65. 66. 69. — (A XI)	62	1
42.	Long-sleeved dress (male?): 88. 95. 108-113. 123. 139. 140. — figs. 59. 68. 70.	62	1
43.	Man's gown with hood (No. 76): 90. 92. 95. 113-115. 139. 140. 145-146. 179. 182. 242. 251. — figs. 58. 59. 71. 72. — (A VII).	55	1
44.	Dress for a half-grown girl: 95. 116-117. — figs. 57. 78.		
45.	Short-sleeved man's dress, found together with a pair of long-legged hose (No. 88): 88. 90. 95. 117-119. 138. 140. 145. 164. 165. — figs. 57. 59. 73. — (A V)	110	1
46*.	Dilapidated woman's dress: 100. 119. — (A XV)	70	3
47*.	Dilapidated woman's dress: 119-120. 140. 145. — (A XXIII)	65	3
48*.	Parts of a dilapidated dress: 120	45	3
49*.	Dilapidated dress, found with a fine cross (No. 151): 120. 242. — (A XIV)	65	3
50*.	Remains of a dress: 90. 120-121	52	3
51*.	Remains of a dress: 121. 160. — (A XIII)	65	3
52.	Remains of a dress: 121. 160. 191	70	3
53*.	Back-piece of a dress: 121.		
54*.	Fragments of a dress, found with a cap (No. 84): 121-122. — fig. 58	56	3
55*.	Remains of a dress: 122	55	3

		Depth	Condition
56*.	Remains of a dress: 75. 123	72	3
57†.	Remains of one or more dresses, exhumed by G. Meldorf in 1900. Hood No. 75 belongs to this find: 69. 123.		
58.	Remains of a long-sleeved woman's dress with pleated bodice: 92. 95. 109. 123-124. 151. 242. 254. — figs. 58. 59. 74. 75	60	2
59†.	Small fragment of a pleated dress, sent to the Museum by H. Deichmann: 95. 125-126. 151. — fig. 76.		
60.	Fragments of a dress, exceptionally without side-gores: 92. 95. 96. 126-127. 138. 146. 242. — figs. 60. 74. — (A XXII)	45	2
61.	Child's frock without sleeves, found within coffin No. 15 and together with cross No. 154: 76. 92. 127. — fig. 77	85	2
62.	Child's frock with sleeves: 95. 127-128. — figs. 77. 78.		
63.	Male dress, highnecked and with front opening: 89. 95. 105. 128-131. 132. 139. 148. 149. 242. 254. — figs. 59. 79-81	42	2
64.	Highnecked dress with front opening, found with a very simple cross (No. 160): 66. 90. 95. 130. 148. 156. 207. 209. 254.	66	2
65.	Hood of very clumsy proportions and lacking shoulder gores; much damaged: 87. 90. 153-154. 157. 172-173. 176. — figs. 98. 101. 112. — (A X)	70	2
66.	Hood with large cape and without shoulder-gores; well preserved: 63. 138. 154-155. — figs. 41. 97. 99. 101. — (A IX)	75	2
67.	Hood of similar type: 131. 154. 156. 207. 209. — figs. 100. 101. — (A XXI)	70	2
68.	Remains of a hood of similar type: 99. 147. 154. 157. 162. 242.	100	3
69*.	Remains of a similar hood: 157.		
70.	Hood of similar type with long tail: 154. 157. 242. — figs. 101. 103.	50	1
71.	Hood of younger type with shoulder gores: 121. 154. 160. — figs. 25. 102. 104. — (A VIII)	55	2
72.	Hood of similar type: 97. 147. 154. 160. — figs. 102. 103	58	1
73.	Hood of similar type: 154. 160-161. 162. — figs. 102. 104	55	2
74.	Child's hood, of the same type: 154. 157. 162	100	2
75†.	Hood of the same type, exhumed in 1900 by G. Meldorf (comp. No. 57): 69. 123. 154. 162. — fig. 102.		
76.	Hood of the same type, belonging to the man's gown No. 43: 154. 162. — fig. 102	55	1
77.	Hood of similar type: 30. 89. 103. 154. 162-164. 182. — figs. 102. 104. — (A XVIII).		
78.	Hood of similar type with long and broad tail. Found in an excellent state of preservation: 30. 90. 103. 117. 154. 163. 164-165. 174. — figs. 102. 105. — (A IV)		
79.	Hood of similar type: 87. 117. 145. 154. 165-167. — figs. 102. 104. — (A XVII)	120	1
80.	Hood for a half-grown person, found together with a cap (No. 86): 30. 103. 152. 154. 163. 167. 174. 182. — fig. 102.		
81.	Remains of a hood: 167	75	3
82†.	End-piece of a tail, belonging to a hood. Originates from earlier diggings: 167.		
83.	Cap of cylindrical shape, belonging to dress No. 40: 90. 128. 177. 178. 182. — fig. 118	65	2
84*.	Cap of similar type, belonging to dress No. 54: 122. 177. 178. 182	56	3

		Depth	Condition
85.	Child's cap, found together with a shroud: 178. 179. 182. 242. — fig. 118	40	2
86.	Cap for a half-grown boy found inside the hood No. 80: 103. 167. 178. 179. 182. — figs. 106. 119.		
87.	Cap, high and conical, made of plain-weaved material: 177. 178. 180. 182-183. 242. 254. — figs. 119. 120.		
88.	A pair of long-legged hose: 30. 117. 183-185. 189. — figs. 125-126.		
89.	Remains of hose: 185.		
90.	Hose of coarse plain weaving: 185. 186. 188. — figs. 125. 126.	60	1
91.	Hose, very defective: 185-187. — fig. 126	60	3
92.	Hose, presumably a "stunt hose": 187. — fig. 125	60	2
93.	Hose, very dilapidated: 99. 157. 162. 186. 187-188. — fig. 126. — (A XXVI)	130	3
94.	Foot-wear of leather with incised crosses: 64. 190. — fig. 132 — (A VI).		
95.	Samples of material, fourshaft twill: 190.		
96.	Ditto, of very fine plain weaving: 88. 190-191. 192	65	2
97.	Woollen cord, found in coffin No. 19: 89. 191.		
98.	Woollen cord, found with remains of bear-skin and the arm of a cross (No. 127): 87. 191	90	2
99.	Four pieces of thick cord: 191.		
100.	Two brooches of brass of circular form: 190. 192. — fig. 133.	65	
101†.	Small pendent cross of bone: 192. — fig. 135.		
102.	Two pins of copper, found in a grave together with a bear's tooth: 68. 192. — fig. 136.		
103.	Eight wooden sticks: 68. 192. — fig. 137.		
104†.	Tombstone of granite, found in 1830 by de Fries: 17. 193. — fig. 138.		
105†.	Fragments of a tombstone, found in 1839 and 1840 by Kielsen: 18. 194-195. — fig. 139.		
106-107†.	Two small cross-marked stones, presumably headstones for graves: 18. 190. 195-196. — fig. 140.		
108†.	Wooden cross without ornamentation. Found in 1839 by Kielsen: 198.		
109†.	Similar cross. Found in 1839 by Kielsen: 198-199.		
110†.	Similar cross. Brought home in 1880 by G. Holm: 199.		
111.	Similar cross. Found in coffin No. 26: 81. 199.		
112.	Similar cross. Found in coffin No. 27: 81. 199.		
113.	Similar cross. On the vertical limb four runes: 199. — (R IV).		
114.	Similar cross: 199	90	2
115†.	Similar cross. Found in 1852 by C. P. Holbøll. On the left transverse limb some runes: 200.		
116.	Similar cross. Runes on the vertical limb: 200. — (R II)	120	1
117.	Cross, the arms of which have slightly concave sides: 200. — fig. 144	104	1
118.	Cross. The extremities of the arms are cut off obliquely: 200. — fig. 141	80	1
119.	Transverse limb of a similar cross: 67. 201.		
120.	Stem of a similar cross: 201.		
121†.	Vertical limb of a large cross with transverse grooves at the extremities. Found by Dr. H. Rink: 201.		

		Depth	Condition
122.	Similar cross with transverse grooves, the largest of all: 201. — fig. 142	115	1
123.	Similar cross, covered with runes: 122. 201-202. — (R VI)	75	1
124.	Similar cross: 202. — fig. 143	90	1
125.	Similar cross: 202-203. — fig. 148	110	1
126.	Upper limb of a similar cross: 203.		
127.	Fragment of a similar cross: 87. 191. 203	90	2
128.	Ditto: 203		
129.	Cross with transverse grooves both at the extremities and near the intersection: 67. 203. — fig. 143	75	2
130.	Fragment of a similar cross: 203-204		
131.	Cross with a transverse round at the extremities: 204. — fig. 143	85	1
132.	Cross having a groove along the edges of the limbs and transverse grooves at the extremities: 204. — fig. 146	100	1
133.	Similar cross: 204-205. — fig. 143	90	1
134.	Similar cross. The lower limb terminates in a small die ornamented with a chequered pattern: 67. 205. — fig. 148	130	1
135.	Cross. The limbs have concave sides and transverse grooves at the extremities: 205. — fig. 144	80	1
136.	Cross having runic inscriptions and at the intersection semicircular hollows. Found on the lid of coffin No. 27: 71. 81. 205. — fig. 47. — (R III).		
137.	Large cross of similar shape, but incomplete. Runes on both limbs: 105. 128. 195. 205-206. — (R VII)	85	2
138.	Cross of similar shape, found in coffin No. 29: 206-207. — fig. 144.		
139.	Cross of similar shape: 207. — fig. 145	80	1
140†.	Cross of similar shape. Presented to the National Museum by R. Bentzen: 66. 207.		
141.	Similar cross, somewhat incomplete: 131. 156. 207. 209	95	1
142.	Similar cross: 207. — fig. 145	80	1
143†.	Similar cross. On the lower limb four runes. Found in 1904 by Mylius Erichsen: 208. — fig. 145.		
144.	Cross of similar shape, but of very fine workmanship: 208. 217. — fig. 146	100	1
145.	Fragment of a cross of similar shape: 131. 156. 207. 209.		
146.	Similar fragment: 209.		
147.	Similar fragment: 209.		
148.	Large cross having semicircular hollows at the intersection and at the middle of each limb: 209-10. 217. 218. — fig. 147.	100	1
149.	Cross of crenated outline: 210. 217. — fig. 146	85	1
150.	Fine cross having fanshaped expanded ends and long runic inscriptions: 66. 197. 210-211. 217. (Pl. I in the Runological Section). — (R V)	100	1
151.	Cross having expanded ends and transverse grooves, found in dress No. 49: 113. 120. 211	65	1
152†.	Cross having slanting incisions at the terminations, sent home by the Rev. F. Westerboe in 1849: 82. 212.		
153.	Cross found in coffin No. 28, finely shaped, with circular cross-ends: 82. 212. 218. — fig. 149.	120	1
154.	Cross found in coffin No. 15, having semicircular fields at the extremities and a spike-like termination of the lower limb: 76. 127. 212. 218. — fig. 150	85	3

		Depth	Condition
155.	Similar cross, but smaller: 213. 218. — fig. 150.		
156†.	Cross having cuneiform incisions at the extremities and a spike-like termination of the lower limb, found in 1840 by O. Kielsen: 213-214. 218. — fig. 150.		
157.	Cross in which the transverse limb is inserted in a slit in the vertical limb: 214. — fig. 151	70	1
158.	Similar cross: 214. — fig. 151	70	2
159.	Similar cross found with dress No. 54: 66. 121. 214. — fig. 151.	56	2
160.	Similar cross found with dress No. 64: 131. 207. 214-215.—fig. 151.		
161.	Similar cross, consisting simply of two splinters: 215. — fig. 151.	66	2
162.	Cross formed of a single piece of wood: 198. 215.		
163.	Fragment of a cross from coffin No. 13: 76. 215		
164.	Fragment of a cross found with hood No. 69: 157. 215.	115	2
165.	Fragment of a cross belonging to coffin No. 2 or 4: 215.		
166.	Wooden stick with runic inscriptions, found in coffin No. 30: 62. 69. 84. 215. — (R I)		
167†.	Fragment of a beaker or of the neck of a ewer of tin (G. Holm 1880): 221	100	1
168.	Shard from a small jar or pitcher of Rhenish stoneware: 54. 221. 236. 254. 255.		
169†.	Fragment of a small bowl of soapstone. presented in 1886 by Mrs. Rosenstand: 221. — fig. 154.		
170†.	Fragment of the rim of a flat bowl of soapstone (G. Holm 1880): 221.		
171.	Fragment of a flat bowl of soapstone: 222.		
172-82.	Fragments of soapstone vessels: 222-223.		
183.	Fragment of a large spindle whorl of soapstone: 223. — fig. 155.		
184-86.	Whorls of soapstone: 223.		
187-88.	Loom-weights of soapstone: 223.		
189.	Handle of a little weaver's "sword" of deal: 68. 133. 224. — fig. 156.		
190†.	Oblong granite stone, probably a primitive hammer (G. Holm 1880): 224.		
191.	Fragment of an iron nail: 224.		
192.	Small iron bar: 224.		
193.	Awl or bodkin fashioned of bone: 224.		
194.	Fragment of a whetstone: 224.		
195.	Small lens-shaped soapstone: 224.		
196.	Fragment of an implement of soapstone, with incised hammer: 224-225. — fig. 157.		
197.	Whalebone-box: 68. 225. 257. — fig. 158.		
198†.	Pieces of whalebone (Kielsen, 1840): 225.		
199.	Half of a the deal bottom of a box or barrel: 226.		
200.	Pommel of wood with the owner's mark cut in the upper surface: 68. 226. 258. — fig. 160.		
201.	Fragments of church-bells: 226.		
202.	Two draughtmen of bone: 226.		
203.	Granite stone ("door-stone") with a roughly bowlshaped pit: 226-227.		

ABBREVIATIONS

AfnO,	i. e.	Aarbøger for nordisk Oldkyndighed og Historie (Copenhagen).
ANFB,	i. e.	Aarsberetning fra Foreningen til norske Fortidsminders Bevaring (Christiania).
GHM,	i. e.	Grønlands historiske Mindesmærker I—III (Copenhagen 1838—45).
MoGr.	i. e.	Meddelelser om Grønland (Copenhagen).

SIGNATURES

* after a number, indicates that the piece in question is not preserved.

† after a number, indicates that it does not originate from the excavations in 1921 but has been brought home on a former occasion.

For the diagrams of the costumes:

— — — — Supplied lines are stippled.

. . . . Where the outline of the diagram does not coincide with any seam, it is indicated by a dotted line.

— · — · — · False seams are indicated by a combined stippled and dotted line.

Postscript.

On concluding the present work I wish to express my thanks to one and all of the numerous persons in Greenland, Denmark, and abroad, who have lent valuable aid during its composition. It would be impossible to specify, but those chiefly concerned have, I think, all been referred to in the preceding pages. Before all others I must in this place again mention my travelling companion in the expedition of 1921 to Ikigait, Mr. JOHAN PETERSEN, who not only arranged all practical details, but also rendered excellent assistance in the archæological investigations. Further I am particularly indebted to Professor BILLE GRAM, Dr. KNUD JESSEN, and the late Mr. WINGE, deputy keeper of the Zoological Museum, who readily undertook various microscopical determinations etc. in order to promote the investigation, and, last not least, to Mr. and Mrs. J. RAKLEV who have borne the main burden of the laborious preservation work.

Finally I wish to acknowledge my great indebtedness to Captain DANIEL BRUUN who has given me the benefit of his excellent advice in these first researches of mine in the archæology of Greenland. He has been, himself, a pioneer in these fields, and some of his researches are quite fundamental, while the extensive material for study collected by him and now given into the keeping of the National Museum in Copenhagen together with valuable material for comparison from Iceland and the Faroe Islands will form an excellent basis for further researches.

Of the drawings figs. 32, 75, 79, 98, 112, 134 and 158 were done by Miss BODIL MÜLLER, the rest both in this and the next paper by Mr. P. LINDE who has rendered valuable assistance in various fields. All measurements of plans and diagrams were made by the author, but the finished drawings were done by Mr. Linde. Where no name has been given the photos taken in Greenland have been taken by the author, while the studio photos of the various objects are for the most part taken by Mr. S. BENGTSSON, photographer to the National Museum.

The translation of this as well as of the two following papers has been done by Miss ANNIE I. FAUSBØLL.

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II.

INTERPRETATION OF THE RUNIC INSCRIPTIONS FROM HERJOLFSNES

BY

FINNUR JÓNSSON, Ph. D.
PROFESSOR OF NORSE PHILOLOGY
COPENHAGEN

1924

Interpretation of the Runic Inscriptions from Herjolfsnes.

It is a well-known fact that runic inscriptions have formerly been found in Greenland, carved partly on stones partly on wooden crosses. Two such crosses (above, Nos. 115 and 143) bearing the inscriptions Maria (fig. 1) and Maia (fig. 2) were found on a former occasion at Ikigait, the old Herjolfsnes churchyard. It follows without saying that they have not been without considerable interest as evidences of the Icelandic language in Greenland, in so far as they could be assumed to originate from Greenlanders[1]) and not, for instance, from Norwegian traders. It might be expected that more inscriptions would be found in the course of time, especially when the old cemeteries were excavated, and these expectations were not disappointed.

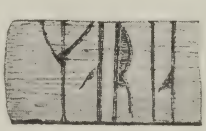
Fig. 1.

During the excavations made by Dr. P. Nörlund in the long since discovered cemetery at Herjolfsnes, at which place the old sources mention a church, seven (or more rightly eight) runic inscriptions have now been exhumed, six (seven) on small wooden crosses placed in the coffins, and one on a wooden stick almost square in section.

I refer the reader to the description of these objects in the preceding pages. Here I shall give an interpretation of the inscriptions in so far as it has been possible for me to interpret them.

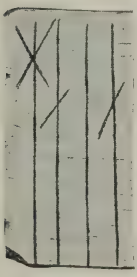
Fig. 2.

I.

Wooden stick (No. 166 of the find). One whole side and half of another are covered with an inscription carved with fairly bold and deep strokes (fig. 3). Each rune is so clear that there can be no doubt about a single stroke. The whole inscription looks as new and fresh as when it was first made. In front of the inscription is carved a well-marked cross which was perhaps intended to replace a real one. The runes are respectively 15 and 10 mm. in height. The inscription runs as follows:—

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[1]) It should be noted that "Greenlanders" in this paper means the descendants of the Icelandic settlers from the close of the 10th century.

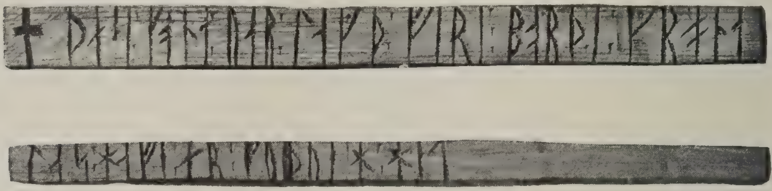


Fig. 3.

┼ᚦᛂᛌᛁ : ᚴᚮᚿᛆ : ᚢᛆᚱ : ᛚᛆᚵᚦ : ᚠᛁᚱᛁ : ᛒᚮᚱᚦ : ᛁ : ᚵᚱᚯᚿᛆ

ᛚᛆᛎ : ᚼᛆᚠᛁ : ᛂᚱ : ᚵᚢᚦᚢᛁ ᚼ : ᚼᛁᛏ

As regards the characters we have here only to note that ᛂ is used for e (æ), ᚮ for o, and ᚯ for ø (œ), all familiar characters from other inscriptions, but the last one is of significance for this inscription. As regards the consonants, ᚵ dotted kaun (the name of the rune) is used for g, ᛎ no doubt for z. ᛁ i is used both for i and (closed) e, as also for the diphthong ei. It will be seen that there is a somewhat greater space between the two last characters in the penultimate word. This is due to the fact that the carver of the runes has placed a main stroke after ᛁ which is plain though not nearly as deep as the others (not quite finished). It is obvious that this should have been the main stroke in the rune following ᚼ, but this latter has fairly vigorous side strokes on both sides. The carver perceived that there was hardly room for these (on the left), so he discarded this stave and carved a new one. Finally it should be noted that all words are separated by dots which look like commas.

This inscription must be rendered thus:— þæsi kona uar lagþ firi borþ i grønalaz hafi ær guþuih hit, i. e. þessi kona var lǫgð firi(r) borð í Grœnalanz hafi, er Guðveig hét, or "This woman, whose name was Gudveg, was laid overboard in the Greenland Sea".

As regards the forms it must be noted that þessi and er have evidently been pronounced with an open e-sound (æ) in contrast to hét in which the vowel was closed, as was also the case in Norway in the 13th century, at any rate in many places, a in lagþ presumably means u-umlaut of a i. e. ǫ (an analogical form with a from lagðr, laid etc. might, however, be possible). — firi is a form that is very frequent in Norwegian, for instance in the Norwegian manuscript of the King's Mirror. — laz must be read lands (lantz, cp. the form lanz in Norwegian and Icelandic manuscripts); n has — as usual — been omitted before the dental (t in z).

Guþuih must be rendered by Guðveig. h here denotes the spirant g in contrast to g in grøna- and guþ-. The h-rune might also have been expected in lagþ; has g in this word been pronounced somewhat differently from the g in veig? It is well known that h is frequently found for the spirant g in Norwegian, especially in the earlier manuscripts. The full form Grœnaland instead of the later Grœn- should also be noted. This form, too, is found in the vellum of the King's Mirror.

All these features are indeed well known. But one thing has not hitherto been known, viz. the name Guðveig itself. It is not found in Lind's book of names. But it falls into line with other female names where each separate component is well known (Guðrún, Guðný, etc. Rannveig, Solveig, etc.). In addition to this new name the inscription presents another remarkable feature. It mentions a woman who evidently died onboard ship during a voyage to Greenland. Such a thing might happen, and did evidently happen sometimes — cp. the rather unpleasant tale in Skáldhelga rímur IV (note v. 17 "rak firi borð enn dauða"). Her body was cast overboard, that was the usual way. But how, then, came this wooden stick in a coffin in the cemetery at Herjolfsnes? Was Guðveig cast ashore there and buried there, or is the wooden stick only a memento, a cenotaph? This question we cannot answer. Only so much is certain that the stick was found in a coffin. (cp. above p. 62 and p. 82).

But is the inscription really "Greenlandish"? That is, is it carved by a native Greenlander? It will be of great importance to answer this question. But as far as I can judge it is not possible to do so with certainty. There is, it seems to me, a great deal that speaks in favour of the inscription being written by a Norwegian. However, we know so little about the Icelandic dialect in Greenland and its history that we can only give a very cautious opinion in this matter. If a native Greenlander is the author, the language is in an earlier stage than Icelandic, æ and e being kept distinct like the i-umlaut of á and ó. The latter only holds good, however, if the inscription is later than abt. 1250. But so, apparently it is; and here the character for ø (ǽ) and presumably for œ, too, must be specially considered, to which the dotted k may be added. The date we must assign to the inscription must, I think, be abt. 1300 or not very much earlier.

II.

Wooden cross (No. 116 of the find). The runic inscription (fig. 4) is on the vertical limb of the cross and ascends from the bottom. It is carved below the transverse limb except the last word which is placed above it. The runes are abt. 2 cm. high, fine, beautifully and regularly carved. In several places they are chipped, which does not, however, render the reading difficult.

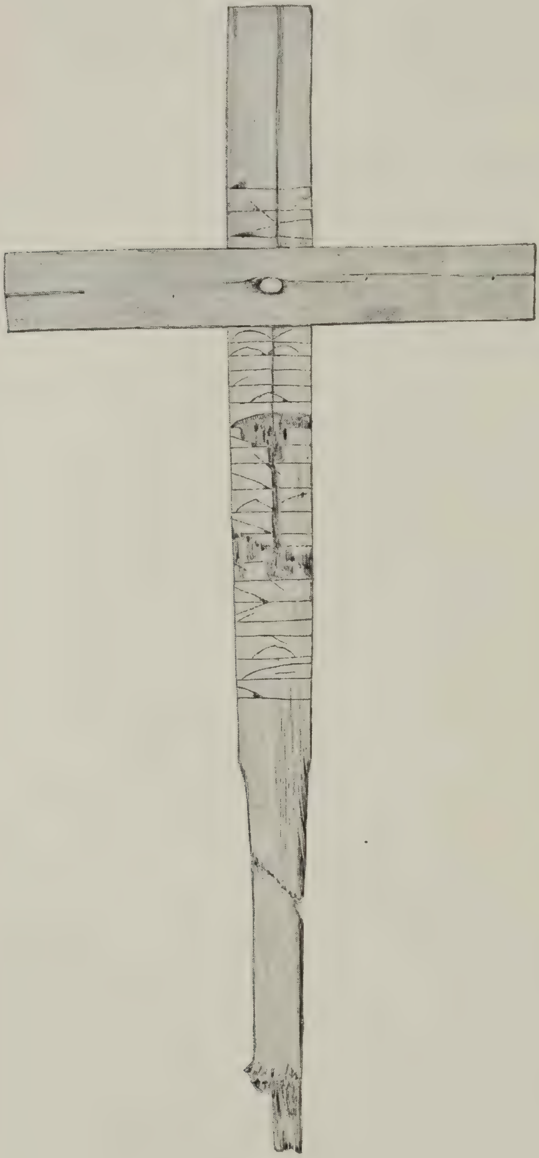


Fig. 4.

The runes consist mostly of the common characters. Here, too, we have the character ᚼ = æ (e) and here we have ᚢ = u with a (shorter) stroke inside which, on the analogy of characters found in some of the other inscriptions, must be read o. Here also we have i for ei. In the ᛒ-rune the lower bag does not descend to the bottom of the main stroke. This rune is here used for bilabial f (v). A bind-rune $\underset{\smile}{\text{ar}}$ is found. Of the eighth rune part of the main stroke stave is seen; the context shows that it is a t. Of the ninth (i) the upper part is missing, in the thirteenth the left part of the side stroke is slightly damaged, and in the fifteenth (u) the main stroke is almost quite gone, but the curved side stroke may be traced in its entirety. Probably u has had a dot here, too, of the same kind as in the first. Some chippings are so slight that they do not require further mention. No dotted runes.

The entire inscription is as follows:—

ᚴᚤᚦᛆᛚᛘᛆ[ᛐ]ᛁᚴᚱᚴᛅᚴ[ᚤ]ᚦᛚᛁᛒᛦ ᚢᛅᛚ

kop alma[t]ikr kæ koþlibar uæl, i. e. guð almáttigr ge(ymi) guðleifar vel, or "God the Almighty guard Gudleif well".

The cross belonged to the grave of a woman, Gudleif. The name is otherwise well-known, as well as the corresponding male name Guðleifr.

Only one word requires special mention. It is the word composed of the runes 12—13, kæ. This is evidently an abbreviation, but there are, I think, only two words we can choose between, viz. the verbs gǽta and geyma. Both govern the genitive. Either gǽti or geymi, i. e. protect, guard, must be meant. They imply a wish or a prayer for eternal salvation. When I prefer to complete the word to geymi, it is because this seems to be more frequently used in connection with "guð" than the other word.

The inscription would seem to be of rather early date if we have here the pronunciation goð (not guð) which is found in the earliest Icelandic manuscripts. Possibly this pronunciation survived longer in Greenland than in Iceland, and it is thus no certain evidence to judge by, or need not be so. The rune ᛅ denotes the open pronunciation; i (besides being used for i) is only found for ei. Of earlier date than the latter half of the 13th century the inscription need not be. The characters themselves give us no information apart from the dotted u which points just to this period.

III.

Wooden cross (No. 136 of the find). The inscription (fig. 5) is carved both on the vertical and the transverse limb. The runes are delicately carved and not deep, abt. 2 cm. high on the vertical and abt. 28 mm. high on the transverse limb. A remarkable feature in this inscription is the strong tendency to bind-runes in the transverse limb because it was to hold many runes in a comparatively small space, whereas only one such is found on the vertical limb. Only here do we find the rune ᛦ = y (dyrk-). Here we find ᚢ with a stroke inside in goþi, kros, while o in mokkum is designated by ᚯ; where, however, it is doubtful whether the lower side stroke crosses the main stroke. This character points to a fairly late date. On the other hand we find ᚮ = o in ok and ᚢ (u) in þurleifr and in lufs (lofs). One might have expected the same rune to have been used in all these cases. In gorþi which is carved on both sides of the nail (gor — þi) we find ᚮ, which can here only denote ø. I is used for ei in -leifr. There are

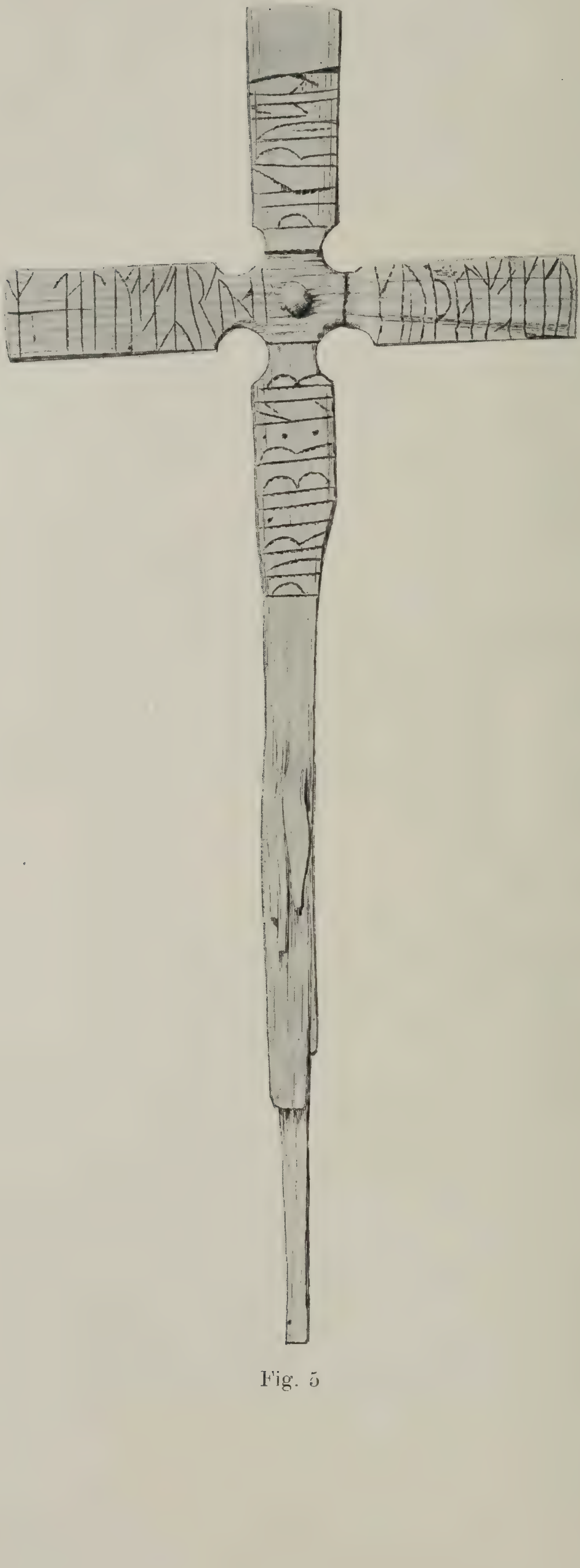
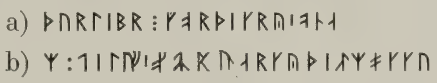


Fig. 5

no other dotted runes. Punctuation is only found after m (two points) and after þurlibr (three points).

The inscription reads as follows:—



a) þurlibr⁝ korþi kros t͜ana
b) m: tilu͜fs o͜k d͜yr͜ku͜nar koþi a͜lmokku

i. e. þorleifr gørði kross ðanna
til lofs ok dýrkunar goði almókkum

“Torleiv made this cross in praise and worship of God the Almighty”.

We must remark at once that it is not quite certain which line should be read first. But for syntactic-linguistic reasons the sequence here chosen seems preferable. To this it might possibly be objected that the carver did not begin the a-line at the extreme edge, but some distance from it, but he might very well have done so even if it were the line last carved. This, on the other hand, was fortunate for him. He did not calculate the space properly, it proved too small for the word almókkum. There was no room for the final m, and now he could make use of the empty space. There he placed the final m.

The last word in the a-line is tana; this is a curious form. In the first place it is written with a t, not as might be expected with a þ. This can, I think, only mean d here, i. e. the soft d, ð. This denotes the pronunciation, a fact of great interest. Compared with the adjacent words pronouns are often very slightly stressed (cp. e. g. Icelandic íðað for í það and similar cases) and here þanna has evidently weak stress owing to the preceding kross on which the main stress falls. We shall subsequently meet with another example though of a somewhat different kind. In the second place the form þanna with a (for the ordinary þenna) is interesting. We only know it from two skaldic verses dating from the 10th and 11th centuries (Holmgöngu-Bersi and Þjóðolfr Arnórsson), see Det norsk-islandske Skjaldesprog p. 79. This form then survived, at any rate in Greenland, through long ages, through centuries. On the Kingigtórssuak stone, too, we find t for þ (ð) in the male name þórðr.

In tilufs an l is missing owing to the well-known tendency to write only one consonant where two similar consonants meet, even if they occur in two separate words, as here. In such cases where the preposition, as here, was unaccented, the pronunciation, as in modern Icelandic, would become exactly what the mode of writing might here be presumed to show. On the other hand we have kk in mókkum.

As regards this form, finally, it is written with an o which must presumably be understood to denote ó, ǫ (u-umlaut of á) having here changed to ó after m; further tk has here been assimilated to kk. This assimilation is on the whole rarely found in the Icelandic manuscripts, and if so, only in the earliest; it is superseded by the other forms with t(t)—mót(t)k—. This form also need not testify to any very early date. The same argument that we advanced above holds good in this case. There is much to indicate that the inscription dates from abt. the same period as the preceding ones.

In contrast to the previous inscriptions the name of the person in whose grave the cross was found is not mentioned here. The carver of the runes has, however, considered it advisable to mention himself, possibly in order to contribute a small share to his own eternal salvation.

IV.

Wooden cross (No. 113 of the find). On this are only carved the characters

ᛘᛆᛁᛆ i. e. maia

on the vertical limb below the transverse limb from the bottom upwards (fig. 6). The runes are abt. 18 mm. high and quite plain (the first two runes are slightly chipped). There can hardly be any doubt, I think, that the carver has left out an r, so that we should read maria, i. e. an invocation of the virgin Mary to protect the grave and the dead person and secure to him eternal salvation. Dr. NÖRLUND has called my attention to the fact that the same mode of writing occurs in another inscription found at Ikigait at an earlier date (fig. 2). This is certainly remarkable. But we can hardly assume any other interpretation.

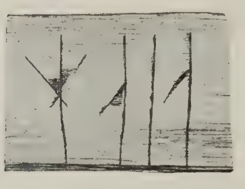


Fig. 6.

We shall now proceed to the remaining inscriptions which all contain similar but much more lengthy invocations commending the dead person to the care of God and the saints, and which are either wholly or partly composed in Latin.

V.

Wooden cross (No. 150 of the find). Both the vertical limb (a) and the transverse limb (b) bear inscriptions (Pl. II).

The former descends from the top to the bottom. The runes are abt. 19 mm. high and very delicately carved. They consist of the usual characters. The form of the r should, however, be noted. The upper side stroke does not join the lower one at the bottom or the main stroke, there being an open space between the side strokes, as in the Össurstone from Napassut (near Ivigtut). The first ᛁ in brikit might possibly be interpreted as an a, but the transverse stroke is I think only apparently and not really a carved side stroke. In the i-runes in mikai we find a small horizontal stroke, it only consists of small cracks in the wood. After the first word there are two points which can only denote that this word should stand alone. Hence it corresponds entirely to the word in IV and has the same sense here. With regard to the last rune in brikit see below.

The inscription runs as follows:—

ᛘᛆᚱᛁᛆ:ᛘᛁᚴᛆᛁᛆᛘᛁᚴ ᛒᚱᛁᚴᛁᛚ

Ma͜ria: mikai amik brikit
i. e. Máría: Mikai á mik Brígit
"Maria. Mikae(l) owns me Brigit."

We shall return to the word mikai below. Brigit: the last character usually denotes l, but a name Brigil is unknown; as ᛐ and ᛚ are often confused, i. e. reversed, I do not hesitate to interpret the character as a t; we shall then have a well-known female name found as early as the 11th century in Norway. It has various forms (see Lind); here we have the form Brígit or possibly Brígið, as t may denote both d and ð (besides t). "Owns me" of course only means that Brigit is under the special care of the archangel Michael. The latter played an important part as the angel who was to "weigh the sins". It was thus of special importance to be on good terms with this angel. That mikai stands for Mikail cannot be doubted. L is, I think, only omitted because there was not room for it just by the nail, and the carver would not place it on the other side at a considerable distance.

Dr. Nörlund thinks differently. According to his reading Mikai is parallel with Maria, and mik denotes the cross itself. ("Brigit owns me"). This may be possible, but we should then have expected the word-order: B. á mik.

After this inscription we find one more word, but carved the opposite way, the top of the runes pointing in the opposite direction, and without any punctuation, evidently carved by the same man, the runes being quite similar in character. They have the following appearance:—

ᛐᚮᚱᛁᚱ

and can only be read torir. It is inconceivable that t should here denote þ, so that the word should be rendered þórir, i. e. the well known male name. I suppose that t must here denote d and hence ð or, in other words, that we must read ðórir. We find, especially in Norwegian manuscripts, Ð written as an initial for Þ, and I think it is this rendering we find reflected here.[1]) There must be some special reason for detaching this name from the rest of the inscription by placing it upside down. It must be the name of the carver which has been placed here as a kind of signature, of similar importance to the long inscription on III. It is presumably the same idea that has here given rise to the modest inscription of the mere name. Þórir might also be imagined to be Brigit's husband, of course.

b) Just as clear as this a-inscription is, just as obscure is on many points the b-inscription on the transverse limb. It is of an entirely different character. The transverse limb proves to be of a different kind of wood, the runes are of a different character and are inverted instead of standing upright as in all other cases both before and after. There is only one conclusion to be drawn from this, viz. that the transverse limb originally belonged to an entirely different cross but was used to repair this cross. That will give us the best explanation of the position of the runes. The person who repaired the cross probably did not understand the inscription though perhaps he attributed some mystic power to it.

Hence we have here part of an entirely different cross. The runes have been inscribed with some very fine and pointed implement like a needle. They are abt. 15 mm. high, some a little less, especially those below and near the middle of the nail. The inscription is divided into three panels by the small ridges produced by the carving. The first and the second panel (the large centre-panel) are closely connected, and probably also the centre panel and the last panel. The third rune from the nail is slightly chipped but it is no doubt a ᛚ l. In the penultimate rune in the centre panel there is a small crack at the top on the left, but this is no side stroke, the rune being ᛁ i. The two final runes (in the third panel) are not quite clear. The last one is no doubt a bind rune, there is, I think, no side stroke on its right side. The runes below the nail seem quite clear. The very first character is a strange figure. It resembles a P with a straight oblique line on the top lefthand side, and a small slightly curved line descending from the curved side stroke. What this character signifies is quite uncertain. Of the runic characters only one requires further mention, viz. the character ᛂ which is found four times. It is undoubtedly an e, i. e. a "dotted" i, where the point in the main stroke has become a ring. This is of the greatest importance for the dating of the inscription, for this character is of rather a late date. Altogether the individual characters are plain enough (possibly the two first ᚴ are dotted — as regards one of them see below — and, apart from the first mentioned character, may be rendered thus:—

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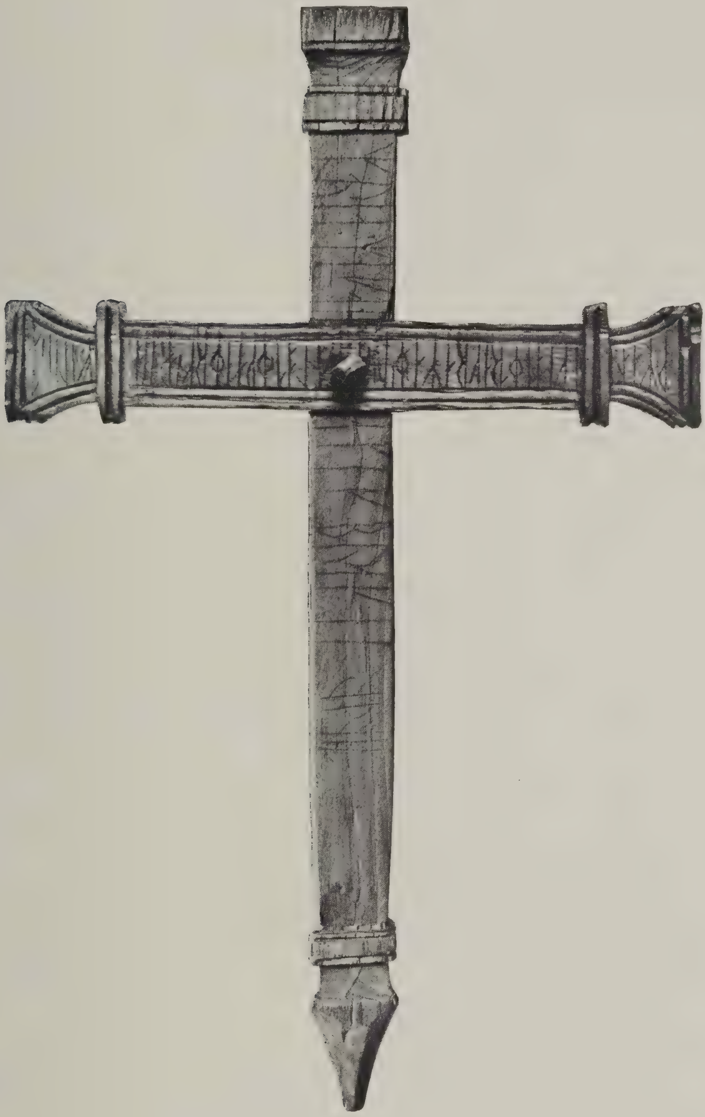
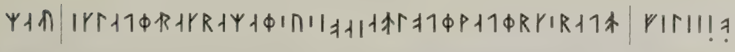
[1]) Cp. *tana* above and the stone from Kingigtórssuak.



Cross with runic inscriptions (V).



i. e. maauiklatetrakramaesussoaiaonlotepaterksratonfiliiiat(?)

To begin with the inscription looked extremely puzzling. Then the word tetrakrama was discovered. This showed clearly that there could be no question of secret runes as might have been supposed. It is also obvious that some parts are uncompleted words, abbreviations that render the interpretation difficult or impossible. Right at the beginning there are abbreviations. I suppose that ma stands for maria, a well-known beginning. The next rune is au, i. e. ave(?). Ikla is possibly an error for the familiar akla, i. e. agla, an abbreviation of a(tta) g(ibbor) l(eolam) a(donai) = thou art everlastingly strong, o Lord. This agla is found for instance on Saleby church bell. For this interpretation of ikla I am indebted to Professor M. Olsen. Dr. Fr. Ohrt conjectured the same interpretation. Next comes the well-known word tetrakrama, i. e. tetragramma which denotes the word iahwe as it is written in Hebrew ("four letters"). The usual form in magic formulas and the like is tetragrammaton. Then follows esus which no doubt stands for iesus. Then come 10 runes (one bind rune) of which the two last, te, might be interpreted as deus. The two first ones, so, might denote soter = Saviour; aia might stand for adonia (but cp. aton in the following; the same word might, however, have been abbreviated in different ways). On Dr. Fr. Ohrt kindly informs me might be the Greek participle ōn which was a popular magic word. This is, however, uncertain, and the succeeding lo is obscure, too. After te occurs a P-like character, I think it is the Latin p which, together with the succeeding ater forms the word pater = father. The runic alphabet did not possess any special character for p, therefore a special character was invented for this letter at a rather late date, by opening the bags of the ᛒ at the top and bottom. In this way a K-like character was produced. It was perhaps unknown in Greenland.

The six succeeding runes (the last one a bind rune) are difficult. Prof. M. Olsen thinks it possible that ksr means kristus rex; aton might be adonai. Finally this is succeeded by filii which must presumably be the genitive singular, but by what it is governed, is obscure. The last runes, iat (hardly ita) I cannot explain.

Hence the inscription may with some reservation be rendered thus:—

ma(ria) au(e) agla tetragramma Iesus so(ter) a(don)ai on lo de(us) pater k(ristu)s r(ex) adon(ia) filii iat

It is thus chiefly composed in Latin and is closely related to later magic formulas familiar from magic books (see for instance the Icelandic

Svartkonstbok ed. 1921 p. 26). Hence the inscription must be regarded as a means of guarding the peace of the grave and the dead person whose name we cannot suppose to be indicated in it.

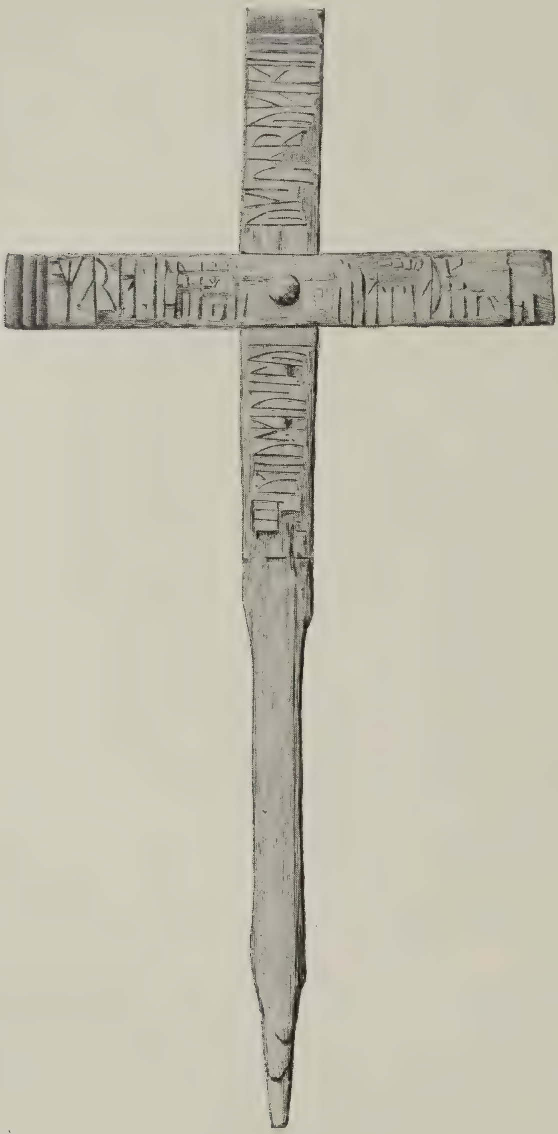


Fig. 7.

The inscription was composed by a member of the clergy, a priest of the church. He must have been a man of erudition, being possessed not only of the usual Latin learning of his time, but knowing medieval modes of expression of a mystic kind. It seems remarkable to meet with such an inscription in this remote part of the world.

As we said above, the character for e indicates a late date. As the b-inscription must be older than the a-inscription, the latter cannot be earlier than abt. 1300, more probably somewhat later.

VI.

Wooden cross (No. 123 of the find). The inscription (fig. 7), found on both limbs, is quite uniform. The runes are plain, deep, and comparatively broad, abt. 17 mm. high. Some are not a little chipped and on that account not easily determinable. The individual characters do not call for much comment. In ᚢ we find a long stroke no doubt to denote o. Some bind runes occur. Only after maria on the transverse limb do we find two punctuation marks. With regard to the damaged runes we note the following. The seventh rune on the transverse limb is slightly damaged, but quite certain. The ninth rune is somewhat doubtful, its left side stroke is certain, but does not ascend as far as might be expected if for instance an m were intended. Hence the character, I think, must be an h whose side stroke from left to right has been chipped off. Next we see two straight strokes damaged in the middle part, and then another stroke damaged at the top and, to the left of its top, a small stroke. These three strokes are not, I believe, runes, but a kind of frame or boundary lines, three such strokes being also found before and after the inscription (on the transverse limb). After the nail there are faint traces of two runes, probably ᛁᚮ, which the carver began (the name ioanes), but for some reason did not like. So he repeated them. i is somewhat damaged but beyond doubt. Runes 4—6 (after the nail) are also damaged but certain: i s f. After the succeeding bind rune (aþ) follow three strokes the first of which is undoubtedly a main stroke and an i, but then comes another i. Obviously the carver has repeated the i by mistake. Of the last rune only the lower part of the main stroke and a side stroke on the right are seen. From the shape of the latter it can only be an r, the side stroke is quite similar to that in the r of the first word. Thus the only possible reading is faþiir (the side stroke in þ is unusually large) i. e. faþir, nom. sing.

On the vertical limb the first rune is damaged, but here can be no doubt that it is an i. In front of it are three distinct framing lines. The seventh rune, undoubtedly an s, is a little oblique and has, as it were, too little room. It has, in fact, been omitted and added afterwards. The apparent punctuation mark immediately following is no doubt connected herewith. The thirteenth rune (l) is a little damaged at the bottom. After i, before the nail, there has never been any inscription, for instance an m. The fifth character after the nail is a little damaged, but is undoubtedly n. The lower part of the main stroke of the rune following (r) has been chipped off. The three strokes after i (in anti) are not runic characters but framing lines.

The entire inscription should thus be read:—

a) ᛘᛅᚱᛁᛆ : ᛁᛚᚮᛁᚼ . . (ᛁᚮ)ᛁᚮᛆᚿᛁᛌ ᚠᛆᚦᛁᛁᚱ
b) ᛁᛌᚢ ᛐᛁᚢᛌ ᛘᛁᚢᛌ ᛁᛚᚮᛁ ᚮᚴ ᛌᚢᚿᚱ ᚮᚴ ᛆᚿᛐᛁ

i. e. a) m$\underbrace{\text{ar}}$ia : iloih . . io$\underbrace{\text{an}}$is f$\underbrace{\text{aþ}}$iir
b) isu tius mius iloi ok sunr ok anti
i. e. a) Máríá. Elóí h . . Ioanes faþir
b) Iesu deus meus Elóí ok sunr ok andi.

The inscription, I think, begins with the a-line, with Maria, like the preceding ones. Here, too, the Virgin Mary is placed first as the

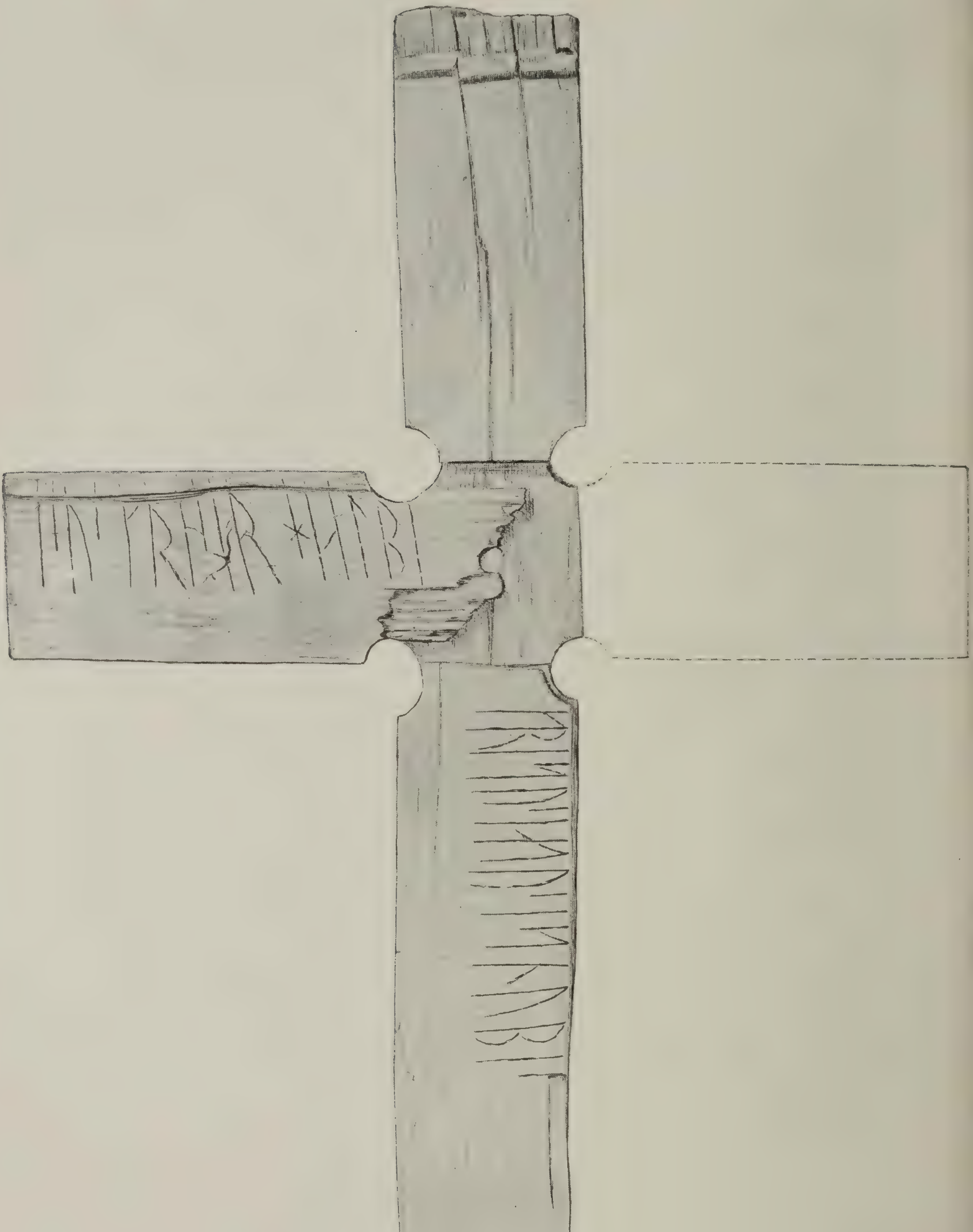


Fig. 8

chief protectress. The next word is the name of God. “Ioanes” is presumably the Baptist.

The b-line is quite clear, but there is a remarkable mixture of Latin and Icelandic in this part of the inscription. The immediate impression gained is that the words should be arranged in a different order to that given above, so that the Latin words are read together and the Icelandic words together, thus, faðir ok sunr ok andi.

It would then be rendered thus: Maria, Eloi, h . . Joanes. Jesu, my God. Father, Son, and Spirit.

The first i in iloi stands for e, as also the i’s in isu, tius, mius. Sunr presumably means sunr and not sonr, as o seems in all other cases to be indicated by ᚢ with a stroke inside.

VII.

Wooden cross (No. 137 of the find). Fragments only and these are damaged. Two bear runes, the left part of the transverse limb, and the vertical limb below this (fig. 8). They have been inscribed with a fine point and are of considerable height, being 3 cm. Several of the characters are chipped, especially the side strokes, and on that account rather illegible.

a) The transverse limb. The characters, especially the final ones, are very indistinct, but certain in all essentials:

ᛁᛌᚢᛌ· ᚴᚱᛁᛌᛐᚱ ᚼᛁᛆᛚᛒᛁ

There seems to be a point after the fourth rune at the top which we should not have expected. Possibly it is no runic point. Runes 6—10 are more indistinct than the first ones, and the rest very indistinct. Of the side strokes of the first of these I am convinced that I can trace the upper oblique stroke on the left and, more faintly its continuation downwards on the right. This is really enough to determine it as h as no other rune can have such a side stroke so far down. The next rune is ᛁ, i; next follows a distinct ᛆ, a. In the third rune from the end the side stroke is at the top on the right, hence it is an l. The penultimate rune is probably ᛒ not ᚱ, but the curve of the lower side stroke is slight. As this reading of the inscription makes excellent sense its correctness can hardly be doubted.

It says:—

isus kristr hialbī
i. e. Iesus Kristr hiálpi
or “May Jesus Christ help”.

The sentence is then — in contrast to b, as we shall see — in Icelandic.

b) Of the first character only the main stroke is seen, the side stroke being worn away, as well as the top of the main stroke. I think, however, I can distinguish a small remnant of the former. It must have been rather short in comparison with the main stroke, as is the case, too, in the k-rune in a. The next six runes are quite certain. The main stroke of the eighth rune is certain, its side stroke is invisible, but must have been an oblique stroke to the right; the rune is n. The next four runes are fairly distinct, but the u-rune is chipped in the middle part. In the upper part the runes are on the whole somewhat worn, so that the side stroke in t is rather thin. The inscription reads as follows:—

ᚴᚱᛁᛌᛐᚢᛌᚿᛆᛐᚢᛌᛁᛌᛐᚿᚢᛒᛁᛌ

Kristus natus ist nubis

i. e. Christus natus est nobis
or Christ was born for us (for our salvation),

as we see, a Latin sentence.

However, the two sentences undoubtedly belong together, for b gives the motive for a: May Jesus Christ save us (this I dare pray for, for) Christ was born for us. That the two sentences have from the beginning belonged together appears from the fact that the characters of both are quite uniform. And the contents are in excellent agreement. Why the carver should have employed both Latin and his mother tongue is, however, obscure.

The question of numerical relations in these inscriptions is perhaps an aimless one, we shall however, take a brief survey of it. On the stick there are 47 runes (not 48, since the fine stroke, the unfinished rune should hardly, I think, be counted). In II there are 24 runes if we reckon the bind rune as two. In III there are 48, all bind runes being reckoned as 2. In IV there are only 5. In Va there are 24 if the bind rune is reckoned as one. V b is difficult, but here there are 54 if the first character is counted and each bind rune reckoned as 2 (i. e. $2 \cdot 24 + 6$, the multiple of 6, or 18) VI is difficult, too, as it is uncertain whether 2 runes have come after h (as is probable) or only one. If we reckon with 2 there will be 48 when all bind runes are counted as one and i in faþiir read twice. In VII, finally, there are 36 (i. e. $24 + 12$ or the multiple of 12 or 6). From this result it might appear as if the number 24 or parts of it had played a rôle. In that case, however, I must regard these numerical relations as an inheritance from earlier times, no magic power having perhaps been attributed to them by the carvers who could not know what lay behind them.

There is a religious note sounded in these old inscriptions dating back 600 years. But the spirit is the same that we meet with, for instance in the ancient Icelandic poems. Men feel their dependence on a higher power and try to secure its good will and protection, not only for the person hidden away in the earth but for the survivor (the carver of the runes). Also the dominant rôle played by the Virgin Mary in the inscriptions agrees well with what is known from Iceland, for instance from the poem Lilja. In point of time these inscriptions are not far removed from this poem. For they all date from abt. 1300, a little before or a little after. There can be no doubt that not one of them dates for instance from the 11th or the 12th century. Owing to the small amount of material at hand it is difficult to speak more definitely about its age. The equipment of the graves is of course of great importance here, but this, if anything, points to an even later period (abt. 1400). However, it corresponds well with the circumstances of the find that in general the crosses belong to the oldest objects found in the churchyard (above p. 64 seq.).

Who were the carvers of the inscriptions is fairly clear. It must have been priests or members of the clergy who composed the Latin and mixed inscriptions whether in their own behalf or on behalf of others is of course uncertain, most probably the latter. From this we may draw the conclusion that they also composed the unmixed Icelandic inscriptions, but we do not stand committed to this conclusion.

I call the language Icelandic because, apart from the inscription on the wooden stick, I can find no deviations from the ordinary Icelandic of abt. 1300, excepting of course the above-mentioned forms goð and þanna.

Finally we shall give a list of the characters employed and their values.

a: ᛆ probably also employed for the umlaut ǫ I (lagþ).
æ̆: ᛅ (I bis, II) and ᛰ (V).
i: ᛁ also employed for e (closed VI, VII) and é (VII), and for ei (I, II, III); i is also found in firi (I).
o: several characters are found for this. 1) ᚢ (lufs, þur III; nubis VII); 2) ᚤ (II, III, VI), everywhere for short o. 3) ᚭ (I, III,VI); this is also used for ø (gørþi III).
ǽ (ǿ): ᚯ (I) seems also to be employed for ó (III mókkum).
u: ᚢ also used for v.
y: ᛉ (III) only once (dyrk-).
au: does not occur, nor ey, except perhaps in kæ (II) = geymi (?).
b: ᛒ this is also used for f (v) the spirant, (II: koþlibar) and for p in VIII (hialbi).

d: ᛐ (VI bis). } cp. t.
ð: ᛐ (III, V) } and as a rule þ.
f: ᚠ cp. b.
g: ᚴ (II, III), ᚼ (I the spirant), ᚵ (I ter).
h: ᚼ also used for the spirant g.
k: ᚴ also used for g (II, III, V).
l: ᛚ cp. t.
m: ᛘ
n: ᚿ
[p: p Latin p V].
r: ᚱ
s: ᛌ
t: ᛐ, ᛚ (once in V, perhaps by mistake); also used for d and ð, see above.
v = u.
z = ᛋ (I laz = lants).
þ = ᚦ which as a rule also denotes ð.

The word Jesus presented difficulties to the carver, it is written in two ways, isus (VI, VII) and esus (V).

III.

ANTHROPOLOGIA MEDICO-HISTORICA GROENLANDIÆ ANTIQUÆ

I.

HERJOLFSNES

BY

FR. C. C. HANSEN, M. D.
PROFESSOR OF ANATOMY
COPENHAGEN

WITH 30 TEXTFIGURES AND 260 FIGURES
ON TABULA I—LXXXV

1924

Chapter I.

Introduction.

In the summer of 1921, after negotiations with the National Museum, The Commission charged with the Geological and Geographical Survey of Greenland caused an archæological expedition to be sent to Ikigait in the district of Julianehaab in South Greenland. From former investigations it was known that, in that locality, there had been ruins of the now extinct medieval Norse colony, Herjolfsnes. The object of the expedition, which was conducted by Dr. Poul Nørlund of the Second Department of the National Museum in Copenhagen, was to examine the ruins, and more especially the medieval cemetery in which coffins and skeletons with clothing (of coarse frieze) originating from the extinct Norse population had been found. A few Norse skulls from Ikigait cemetery had as early as 1905 been presented by Mylius-Erichsen to the University Museum of Normal Anatomy, where they had, it is true, been examined, but they were not incorporated in the large "Crania Groenlandica", published in 1915 by Professor anatomiæ Fr. C. C. Hansen of Copenhagen University and Professor anatomiæ C. M. Fürst of Lund University. This work treats some 400 Eskimo skulls from Greenland, chiefly belonging to the Anatomical Museum in Copenhagen. Further, it contains much information of importance for the present anthropological investigation, and to this work, too, the reader is referred for several anthropological facts characteristic to Greenland and, in regard to history and literature, more especially to the historical and geographical introduction written by Fr. C. C. Hansen. This latter section was also published separately (not in the market) under the title "Outlines of the Geography and History of Greenland for the Use of Anthropologists", 1915 Copenhagen, and contains a comprehensive list of literature, historical and geographical maps, portraits and other illustrations.

The skulls from the find of 1905 (Ikigait No. 343 and 344) have been included in this investigation which deals with all the skeletons which, unfortunately in a much damaged condition, were exhumed in Dr. Nørlund's excavation of the medieval Norse cemetery at Herjolfsnes (Ikigait). The archæological and historical part of the investigation and excavation of 1921 have been described by Dr. Nørlund in his "Buried Norsemen at Herjolfsnes", in Meddelelser om Grønland vol. LXVII 1924, to which we refer the reader for these aspects of the matter.

In the present anthropological and medico-historical treatise the entire material of skeletons exhumed from the cemetery at Herjolfsnes (Ikigait) is described, but in addition to this I have sought to gather as much information as possible with regard to the build, somatic complexion, life, and diseases of the persons in question as can be conclusively ascertained by the anatomical and anthropological investigation. In this way an astonishing insight was gained into some of the conditions and causes which probably contributed in a high degree to the decay and final downfall of the Norse colonies. These causes and conditions have hitherto been a puzzling unsolved mystery, on which, however, Dr. Nørlund's researches and the present anatomical, medico-historical investigation have now thrown unexpected light.

In researches carried out by the Second Department (the Historical Department) of the National Museum, Copenhagen, the Professor of Anatomy in the University of Copenhagen has for a number of years rendered his assistance in the examination of skeletons or in other anthropological investigations, whereas the First Department (formerly the Museum of Nothern Antiquities) has its own medical expert. After Dr. Nørlund's find had begun to undergo further treatment, the Second Department applied to the Professor of Anatomy in the spring of 1922 for certain information with regard to the skeletal remains found in the shrouds. In spite of the very poor and exceedingly fragmentary condition of this material which at first sight seemed to indicate that it was hopelessly damaged and devoid of all value, the Professor of Anatomy thought it right to subject all the skeletal remains from the shrouds to a thorough examination, partly on the principle that nothing should be discarded that had not actually been examined, and partly because the material in question, though much injured, was, (by the dresses) well-dated material (commencement of the 15. century) belonging to the extinct Norse population of Greenland. Hitherto nearly all skeletal remains of this population had been lacking, and what there was of skeletal material had never come under scientific treatment. The Professor of Anatomy regarded the examination of the skeletal material now exhumed as probably the only possibility of gaining information, beyond that contained in the sagas, of the build, somatic condition, and possible pathologic conditions of the Norse population in Greenland. For these reasons it was resolved that all the skeletal remains, even those that were apparently most injured, should be carefully anatomically examined. The Professor of Anatomy then requested that all the skeletal remains found in the shrouds might be sent to him and, as already stated by Dr. Nørlund, there were no remains from coffins, since everything had there become entirely decomposed.

The rest of the skeletal remains were then received in May—June 1922. (According to the excellent custom of the National Museum, the remains of each individual had been carefully kept by themselves). The material comprised the remains of in all 25 (26) individuals. At the Museum of Anatomy the Professor of Anatomy immediately upon its reception proceeded to cleanse, sort, and preserve the as yet quite damp skeletal material with the assistance of the preparator Mr. Alfr. Rasmussen. Everything which could in any way be imagined to be of importance for the scientific treatment or the microscopical examination was carefully kept or examined. In the autumn of 1922 a complete view of the anatomical material had been gained, and Dr. Nørlund was informed of everything essential in the results that might be of interest for the archæological investigation. By a comparison of the anatomical facts regarding the age and sex of the individuals with such information about the sex as could be gathered by Dr. Nørlund's examination of the dresses, it was ascertained that these two series of investigations, anatomical and archæological, had, quite independently of each other, given good, on most points even astonishing, agreement. Only in one or two cases was there some divergence, perhaps only apparent, in the determination of the probable sex of the individual.

A temporary report of the results found in the investigation was laid before a meeting of the Royal Danish Palæographical Society on November 28th, 1922. Dr. Nørlund communicated the archæologico-historical results, Professor Finnur Jónsson reported on the inscriptions on the runic crosses, and Professor Fr. C. C. Hansen submitted his anthropologico-anatomical results.

At the request of Vice-Admiral C. F. Wandel, President of the Commission for the Investigation of Greenland, Professor Fr. C. C. Hansen undertook to prepare a detailed report, profusely illustrated, of the anatomico-anthropological find. Owing to the poor state of preservation of the material it was to be feared that within a short space of time it would materially deteriorate or in part crumble away and be destroyed, so that it was an imperative necessity to undertake as complete and thorough an investigation as possible according to the most recent scientific insight, or it might be feared that in a few years it would be too late.

By profuse pictorial matter it has been attempted to preserve for posterity everything that could be imagined to be of interest. The preparing and furnishing of the illustrations has constituted a very great part of the investigation, and many fragments have had to be assembled, and each little bit of a bone thoroughly examined to determine its place, its anatomical peculiarities, or actual pathological changes. In other words, the whole of the material had repeatedly to be subjected to an exceedingly close study to arrive at a constantly better and more comprehensive result.

The photographs have been taken with great care and skill by Mr. ALFRED RASMUSSEN, under the direction and constant personal superintendence of the Professor of Anatomy. Each of the photographic plates, prints, and clichés has been checked several times and compared with the original by the Professor of Anatomy personally, while all measures were made, and all examinations and reconstructions, microscopical examinations etc. carried out by the Professor of Anatomy personally.

With great liberality the President of the Commission for the Investigation of Greenland, Vice-Admiral C. F. WANDEL, has permitted the very profuse illustration of the researches, thus to render it possible that the considerably increased knowledge we have now acquired of the peculiar somatic and anthropological conditions among the long since extinct Norse population of Greenland may be handed down in the most authentic and substantiated form.

Chapter II.

The Skeletal Material, the Individuals, and Division of the Subject Matter.

In the following we take a brief survey of the skeletons or their remains which constitute the material from the excavation of Herjolfsnes (Ikigait). Only 25 are dealt with in this treatise, however, one case, No. III, having been discarded as originating from another locality. To this must, as we have already mentioned, further be added 2 Norse skulls from Ikigait, presented to the Museum of Normal Anatomy by Mylius-Erichsen in 1905.

The number of individuals was 25 (+ 2). In most of these the age could be determined with striking certainty from the condition of the epiphyses, as the individuals were chiefly young. The sex could be determined partly conclusively, (by means of the pelvis), partly with probability anatomically, and this diagnosis of the sex was subsequently in part verified, in part corroborated in most of the cases by the examination of the dresses. However, as Dr. Nørlund emphasises in his treatise[1]), it must be noted that the divergencies between the male and female dresses were in those days often quite small. Sometimes the difference consisted chiefly in the length, the female dress reaching as a rule to the feet, while the male dress came down to the middle of the calf or to the ankles. Other essential elements may of course occur which in a given case permit of a probable or conclusive determination. However, in a case like the present where the determination of heights must in the anatomical investigation be regarded as approximate maximum heights, it must be taken into account that there will thus be a margin within which a given dress, which in length is just on the borderline, may perhaps not only be taken for, but possibly also have been employed as a real female dress by a female individual who was somewhat lower of stature than the man for whom it was perhaps originally intended. Again, the possibility must be taken into account (see case XX) that a poor woman or female servant may have had not only some of her mistress's discarded clothes given to her, but that she may perhaps have been able to wear one of her master's discarded gowns if she was only so much shorter that it reached to her feet.

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[1]) P. 137—41.

As regards sex there was as a rule good agreement between the results of the examination of the dresses and those of the conclusive or probable anatomical cases. In those cases where the anatomical investigation had insufficient material at disposal for a probable determination of sex, the dress could, on the other hand, where it showed characteristic male or female traits (certain hoods, for instance) of course provide a probability for the determination of the sex which would otherwise have been precluded.

The skeletal material from 1921—22, exhumed in 1921, constitutes 25 individuals:

7 adult males, of which 3 were under 30 years of age.
10 adult females, of which 6 were under 30 years of age.
4 adults (sex uncertain), of which 1 was under 30.
4 children, from abt. 11 to 16 years of age.

The number of young individuals was striking, 10 alone being between 18 and 25 (30) years of age, in addition to the 4 children.

In a subsequent section dealing with what may be deduced from the dimensions of the coffins, we shall show how the death-rate for children must have been very high, but no skeletal remains of little children have been preserved. Evidently they decayed more rapidly.

In the following we shall give 2) a table of the separate individuals with the anatomical numbers appended and the numbers employed in the archæological investigation, while in certain cases the dress is mentioned. 3) Next follows a quite brief survey of the individuals from I to XXVI in succession with certain diagnoses gathered from the examination, whereupon we proceed to 4) the detailed and anatomical investigation of each separate case and 5) of the skulls (the question of Eskimo intermixture). Connected herewith is the attempt 6) to reconstruct the face of one of the skulls from Mylius-Erichsen's find from the cemetery at Herjolfsnes (Ikigait).

In certain chapters we give a general summary of 7) stature, 8) age, and 9) the somatic constitution, hereunder diseases and other somatic defects in the individuals, 10) the condition of the teeth and conclusions as regards conditions of nutrition drawn therefrom which are of interest in that connection.

As cases that are particularly remarkable or treated in more detail must be mentioned I, II, X, XV, XVII, XVIII, XIX, XX, or nearly one-third of the whole number. Under these a series of particularly interesting and important phenomena are discussed at length in their connection. The reader is therefore advised to study carefully each special case in which the actual proofs and evidence are submitted, for the total result is literally pieced together of a number of small observations in the separate pieces of bones, and reconstruction and assembling of the skeletal parts have been largely employed.

Under the separate cases are given detailed accounts of 11) the examination and preservation of the tissues and the examination of the hair. 12) A separate section treats the dimensions of the coffins and what may be deduced as regards the proportions of the entirely decomposed individuals for whom the coffins were made. The results on this point far exceeded expectations, and it is not known to the writer that the method employed by him has been used before. At any rate it would perhaps be possible by this or a similar method to arrive at some anthropologically useful result from investigations of the dimensions of individual coffins.

Finally in 13) a conclusive summary we give the general results arrived at as regards the extinct Norse population in Greenland and the somatic causes which may have contributed to its extinction.

Chapter III.

Survey of Individuals I—XXVI (÷ No. III) with Numbers according to the Archæological Investigation appended.

Herjolfsnes (Ikigait) I. Adult female. Age abt. 30—40 years, with kyphoscoliosis (probably also a tuberculous spondylitis of the lower dorsal and upper lumbar vertebral column) and asymmetrically deformed kyphotic pelvis, contracted in the lower aperture. Fairly powerfully built, but the upper part of the body and the arms have been somewhat more slightly built than the lower part of the body and the inferior extremities. Height originally abt. 150 cm. in the erect posture, but under the pathological conditions probably less than 145 cm. (Female dress).

No skull. Remains of the vertebral column, the pelvis, and extremitas inferior.

Hereunder: Discussion of the deformity of the pelvis, and of pressure on the nerves as the cause of atrophy of the muscles of the leg and the asymmetry of the pelvis, also the consequence of such deformities for the women of the population. On sectio cæsarea and its application in the Middle Ages.

Mention of the occurrence of tuberculosis in those days.

Microscopy of hair from man and animals, and of sealskin and remnants of cloth.

Microscopy of tissue (pelvic fatty tissue, osseous tissue, muscular tissue, connective tissue).

Mention of the author's microscopical examination of the state of preservation of tissue from corpses found in bogs and from mummies, also the susceptibility of the tissues to histological staining.

Herjolfsnes (Ikigait) II. Adult female abt. (25—)30 years. Typical female dress. Height abt. 138—140 cm. Shoulder breadth 31—32 cm. Of somewhat slender build. Slight degree of scoliosis. Flat rhachitic pelvis, somewhat scoliotic and asymmetric. Some genu valgum.

A small skull, the face much damaged, but the lower jaw present. Much worn teeth. Skeletal remains of extremitas sup. et. inf.

Mention of the rhachitic deformity of the pelvis and its consequences for parturition and the life of mother and child.

Herjolfsnes (Ikigait) IV. Skeletal remains of a child aged abt. 11—12, from a hood. Teeth conspicuously worn down. Remains of skull and extremities.

Herjolfsnes (Ikigait) V. Adult, powerful individual. Not tall but broad across the shoulders, probably a man. (Dress to correspond). Teeth and remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) VI. From a piece of skin which, without being cut for footwear, is supposed to have been used as such. On the inside of the skin there was a piece of cloth of coarse texture. The skeletal remains belonged to a small almost adult individual aged 18—20. (Possibly a woman?)

Herjolfsnes (Ikigait) VII. Adult individual (male) hardly very old, abt. 25—30. According to Dr. Nørlund's statement in September 1923 the gown belonging to this individual was a man's dress that would fit a fairly well-grown individual. Skeleton much decomposed, the remains of the bones compressed.

Remains of teeth and the extremities.

Herjolfsnes (Ikigait) VIII. Young individual, abt. 15—16 years. From a hood, subsequently determined as a typical male article of clothing, so possibly a boy.

Remains of teeth, and the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) IX. Adult individual. From a hood, possibly a man.

Remains of tibia.

Herjolfsnes (Ikigait) X. Adult young woman. The nature of the skeleton mainly indicated a small adult woman, and while the temporary examination of the dress gave the impression that it was a male dress, it was subsequently stated by Dr. Nørlund that it must nevertheless be a female dress, which was in better correspondence with the character of the skeleton. The individual was hardly very old, at most perhaps 25(—30?) years, judging by the epiphyses of the vertebræ. The skeleton was much decomposed in certain parts, somewhat better preserved in others, but throughout very brittle and mostly in fragments. There were numerous remains of most parts of the skeleton which belonged to a very small and slender individual.

Torticollis sin. (wryneck) was shown to be present. Atrophy of the left shoulder region. Remains of a small asymmetrical skull, lower jaw present. Much worn teeth. Remains of columna vertebralis cervicalis, and thoracalis. Remains of shoulder skeleton and sternum.

Microscopy of teeth, bone tissue, and remnants of cloth adhering to the skeleton.

Herjolfsnes (Ikigait) XI. Adult individual, over 35 years, probably a man. (Dress stated by Dr. Nørlund in September 1923 to be a male dress). Height about 162—163 cm. Fairly well-grown individual. Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XII. Adult female abt. 142 cm. in height. The upper part of the body and the arms more slender in proportion than the lower extremities.

Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XIII. Adult individual, not tall. Dress uncertain. Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XIV. Adult individual (Nothing can be deduced from the dress). Remains of the skeleton of the extremities.

Herjolfsnes (Ikigait) XV. Most probably a young woman, as indicated by the whole appearance of the skeleton. From the dress nothing definite could be deduced. From the epiphyses of the bones the age may with considerable certainty be determined to be between 20—25 years. Most probably it was abt. 22 years. It must have been an exceedingly slenderly built small individual, unusually narrow across the shoulders (24—25 cm. in the skeleton), and narrow at the hips with unusually slender bones, for instance in the foot. The left inferior extremity has been considerably feebler and thinner than the right one. The height must have been abt. 138—140 cm. hardly more. Remains of the skeleton of the trunk (pelvis ♀), remains of the extremities. The proportions of the body and limbs could be calculated.

Herjolfsnes (Ikigait) XVI. A young individual, presumably abt.15—16 years, probably a boy (dress, a hood). Remains of teeth.

Herjolfsnes (Ikigait) XVII. Adult individual, not old, abt. 20—30 years, hardly very well-grown.

The skull could be assembled and partially measured. It is very asymmetrical, lower jaw present. The teeth show unusual wear. The skull indicates a woman. (The dress would seem to indicate a man, but the divergencies in the male and female dress are often uncertain. Perhaps a case of misjudged sex?) Remnants of cloth adhering to the skull. Also remains of the skeleton of the trunk.

Herjolfsnes (Ikigait) XVIII. Almost adult youth, hardly well-grown, aged 22—25. The skull could be assembled and partially measured. Lower jaw present. Teeth much worn. Remains of the skeleton of the trunk and extremities.

The dress was a male dress (hood), very narrow at the neck. Compare the small, narrow skull.

Herjolfsnes (Ikigait) XIX. Adult, probably a woman. Rather slenderly built and somewhat scoliotic (see vertebræ and sternum). Height abt. 146 cm., possibly only 144 cm. on account of the scoliosis. Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XX. Adult indivual, judging by the skeleton probably a woman. The dress gives no conclusive indication. The age lies nearer to 25 than 30 years. The height has at most been 145 cm. perhaps somewhat less. Width across shoulders 29 cm. in the skeleton. Slender individual with pronounced cubitus valgus in both elbows and symptoms of rhachitis in slight degree. The right femur and knee are not a little feebler than the left. The components of the skeleton are in part much decalcified and tanned by acid humous substances, here and there penetrated by plant roots, part of the bones have, however, retained their shape and size fairly well, but are in part exceedingly brittle and easily break during examination. The bones are on the whole not large. Remains of the small skull. Teeth much worn. Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XXI. Quite young individual (boy) 16—20 years, probably male. The shroud was stated by Dr. Nörlund to be a normal male hood. Remains of teeth and of the skeleton of the trunk.

Herjolfsnes (Ikigait) XXII. Possibly adult, at any rate over 16—18 years. Only teeth remained.

Herjolfsnes (Ikigait) XXIII. Adult, over 30 years, probably a woman. This was in good agreement with the character of the dress, which could not, it is true, be put together but was stated by Dr. Nørlund in October 1923 to be female.

Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XXIV. Adult. Probably a man, judging by the dress, which was probably male. Height abt. 153—154 cm. Remains of the skeleton of the extremities.

Herjolfsnes (Ikigait) XXV. Adult. Age 25—30 years, possibly a man. This is not contradicted by the dress. Height abt. 158 cm. Fairly powerful individual. Remains of the skeleton of the trunk and extremities.

Herjolfsnes (Ikigait) XXVI. Young individual, presumably abt. 18 years of age. (Age under 20, near 18). Remains of the skeleton of the trunk and extremities.

To this may be added 2 medieval Norse skulls: Ikigait 343 and 344 (1905).

Table 1.

The Archæological Investigation Find No.			The Anatomical Investigation No.		
Dress	Find No.	Sex by the dress	Sex	Age in years	Stature and somatic Constitution
♀ 39 typical female dress fig. 64	39	dress ♀	I ♀	30—40 adult	abt. 150—145 cm. Pelvis asymmetrical, kyphoscoliotic
♀ 38 typical female dress fig. 62, 63, 70, 86	38	dress ♀	II ♀	(25)—30 adult	138—140 cm. Scoliosis, somewhat slender, genu valgum, rhachitis, flat pelvis (skull)
			III does not belong to this locality		
fig. 105 shroud, hood	78		IV child	abt. 11—12 child	
45 dress fig. 57	45		V ♂ probably	adult	powerful
	94	from a piece of skin	VI probably ♀	18—20 young	small
43 ♂	43	hood ♂	VII ♂ probably	25—30 adult	fairly well-grown
♂	71	hood ♂ boy	VIII ♂ boy	15—16 young	
♂ fig. 97	66	hood ♂	IX ♂ probably	adult	
probably ♀ fig. 98	65	hood ♀	X ♀	abt. 25 (30) adult	very small (skull) slender. Torticollis sin. Atrophy of left shoulder
♂ 41 fig. 66—69	41	male dress ♂	XI ♂	adult, over 35	abt. 162 cm.
	36		XII ♀	adult	abt. 142 cm. Slender in upper part of body and arms
uncertain	51		XIII	adult	not well-grown
uncertain	49		XIV	adult	
uncertain	46		XV ♀	22 (20—25) young adult	138—140 cm. very slender, small, difference in femur + patella sin. feebler than dext.
hood ♂	70	hood ♂	XVI boy ♂	abt. 15—16 young	
uncertain (♂?)	79	hood (♂?)	XVII ♀ probably	20—30 adult	not well-grown (skull) (? mis-judged sex)
♂	77	hood ♂	XVIII ♂	22—25 adult	not well-grown (skull)
	34		XIX ♀	adult	144—146 cm. rather small, Scoliotic deformity of sternum and columna
♀ 40, dress quite similar to 39 = I and no. 83 (cap) dress may very well be ♀	40	uncertain (possibly ♀)	XX ♀ (conclusive)	abt. 25 (—30) adult	abt. 145 cm. not powerful rhachitis, cubitus valgus. Femur + patella dext. feebler than sin. (skull)
♂	67	hood ♂	XXI ♂ boy	16—20 young	young individual
	60	fragment of cloth	XXII	probably adult (over 16—18)	only teeth
47 (according to Dr. Nørlund Sept. 1923 — ♀)	47	♀	XXIII ♀	adult (over 30)	
37 ♂ dress fig. 60	37	♂	XXIV ♂	adult	153—154 cm.
possibly ♂	35	possibly ♂	XXV ♂	adult abt. 25—30	abt. 158 cm. rather powerful
	93		XXVI	young abt. 18 (20)	

Chapter IV.

Special Descriptions of the Individuals I—XXVI.

Herjolfsnes (Ikigait), 1921(—22) Skeleton I. Tabula I—XII.

Adult woman, aged abt. 30—40 years, having a hump and lateral curvature of the spine (kypho-scoliosis). The pelvis was a fairly large female pelvis having an asymmetrical, infundibuliform contraction in the apertura pelvis inferior. The height was abt. 150.5 cm. in the erect attitude, but taking into account the deformity (kypho-scoliosis) of the vertebral column, it must have been considerably less (145 cm).

The state of preservation of the skeletal remains was very unequal, some parts, such as the pelvis, being, though somewhat broken through exhumation and removal from the clothing, for the most part in good preservation. Well preserved, too, was the right femur, and, though partly pathologically deformed, some of the vertebræ. Other parts were quite decomposed or very soft and partly decalcified and decomposed, thus the whole of the left free inferior extremity which, as in part ala ossis ilium sin., had either disappeared or was decomposed. The skull had entirely disappeared or was decomposed all but a small remnant, likewise the right inferior extremity below the knee-joint. Of the superior extremities, too, only a few fragments were found that could be used with certainty. In best preservation of the entire vertebral column were the 1st and 2nd vertebræ coccygeæ. The body may be supposed to have lain in such a position that the pelvis and the vertebral column, especially the lower part of the latter, as well as the right hip and femur, were comparatively favourably layered, so that the frost had soon stopped the effect of the putrefaction and the humous acids on the bones after the decomposition of most of the soft parts. These bones were then preserved in frozen condition, whereas alternate freezing and thawing locally in conjunction with the decomposing influence of the earth were able to exert their destructive effect for some time yet on the head, neck, breast, and superior extremeties as well as the whole of the left inferior extremity and the lower part of the right inferior extremity. When the earth froze definitely, decomposition ceased at this stage until the excavation. As soon as the importance was realised of preserving the skeletal remains as well as possible, with a view to their examination and possibly the assembling of the pelvis, they were treated according to the following method formerly often used by us at the Anatomical Museum:—

After very careful temporary cleaning the skeletal parts were laid on cotton wool in large vessels and fixed with abt. 4 p. c. formalin solution in water with the addition of a small percentage of glycerine. Then they were carefully and slowly airdried at a rather low room temperature (April). After drying they were impregnated first with a thinner, then with a stronger and stronger solution of glue (white joiner's glue), after which they were allowed to drain and then dry, also slowly, at a low room temperature. In this way even very brittle bones were made so strong that they could be conveniently handled with due caution. The treatment involved one drawback, however. All the small, broken bone points were transformed into fine, sharp, and pointed needles, on which one could easily prick and scratch one's fingers. It was particularly disagreeable during the work of assembling the pelvis, but that of course only induced further caution in the manipulation of the still somewhat brittle bones. (Other parts of the subsequent finds were treated in a similar way).

Of parts of the skull meriting mention only the free part of the left processus mastoideus was found. This process had not been large, which corresponds with the pelvis being female.

Of the skeleton of the superior extremities the upper part (the articular surface for humerus) of a capitulum radii was preserved. The size showed that the bone in question (and the fore-arm) had been a slender bone indicating comparatively slender arms — as in the other female skeletons from the same excavation.

Of the skeleton of the hands was found I phalanx of a thumb. The distal articular surface was somewhat worn and deformed (perhaps by hard work as I have sometimes seen).

Of the right inferior extremity was found a fairly powerful well preserved os femoris dext., only with a not very bad post-mortem infraction at the back of the diaphysis — probably made during the excavation. The bone was dark brown in colour, it was well preserved with smooth surfaces and in reality the best preserved part of the entire skeleton (no sign of arthritis). Tabula I fig. 1 and later.

Of the vertebral column some vertebræ were found, most of them broken. Best preserved were the corpora of the lumbar vertebræ. The corpora both of the lumbar and the thoracic vertebræ, which show pathologic changes at the borders, are obliquely deformed, corresponding to the kypho-scoliosis evidenced by the pelvis (see also the pictures of vertebræ Tabula II—VI; among them are some, deformed in such a way as to suggest a tuberculous spondylitis). A pronounced deformity is seen with especial plainness in the picture Tabb. V—VI fig. 16—21 of the well-preserved 5th vertebra lumbalis corpus and arcus, which is much deformed, cuneiform and lowest at the left side; the borders of facies sup. and inf. are rough and very prominent, and the anterior and lateral surfaces are strongly concave. The corpus proper of the vertebra shows the following measures expressing the deformity:—

Table 2. 5th lumbar vertebra (Case I).

Corpus height, right side 2.4 cm.
— — left — 1.9 cm.—1 cm. at the left lateral border.
— — centre of anterior border 2.2 cm.
— — — posterior border 2 cm.

The corpus is rather large and powerful, corresponding to the pelvis, where it is figured fastened to I vertebra sacralis. On the preserved part of arcus vertebræ see below.

For the general appearance of the vertebral column, thorax and pelvis of a scoliotic skeleton we refer the reader to the subjoined illustration textfig. I (from Henke's Anatomie u. Mechanik der Gelenke, Leipzig 1863).

This finding in the vertebral column corresponds exactly to the finding in the pelvis which will subsequently be described in detail. It must have been a deformity of the vertebral column of fairly considerable development, but the conditions and form of the pelvis further indicate a reduced functional capacity of the left inferior extremity to which we shall return later. Round about on the remains of the skeleton were found remnants of skin and hair which were examined as reported below.

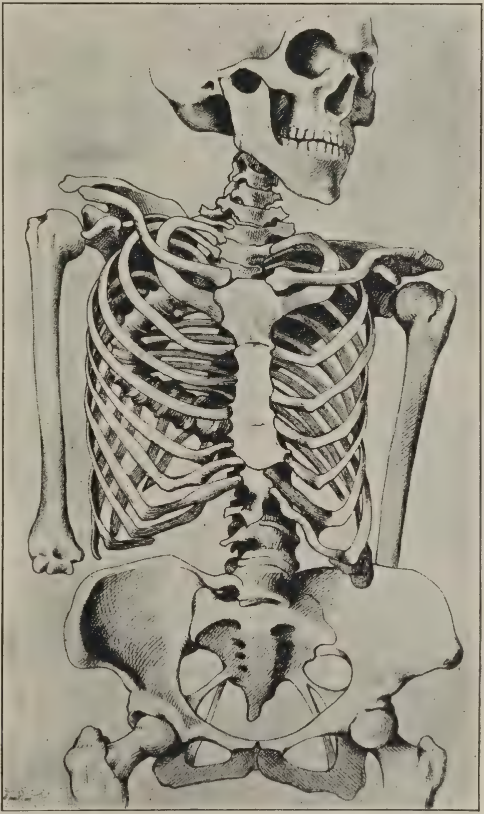

Fig. I. A scoliotic skeleton, female. (Henke).

On the paries posterior in the pelvic cavity, anteriorly on os sacrum was found attached a rather large brittle mass, whitish in the fracture; smaller fragments of a similar kind were found dispersed among the components of the pelvis. The chemical examination showed that the main component was lumps of fatty acid, partly containing remains of connective tissue and cross striated muscular tissue as seen by the microscopic examination (see below). The possibility has been considered that the fatty acids might be derived from a fatty metamorphosis of the pus in a chronic cold abscess or "abscess of congestion" as the French authors add, for instance from a tuberculosis in the vertebral column in the lower thoracic, upper lumbar region, but the corpora of the vertebræ were less well preserved here, and though much in their form would seem to indicate this possibility, we cannot state anything with certainty on this basis alone; but the deformity of the pelvis points distinctly in that direction. The simplest and most obvious assumption is that the fatty acid masses are derived from the adipose tissue in the pelvis and abdomen, and the microscopic finding of the remnants of tissue in some of the fatty acid mass speaks in favour of this, too.

The most important and the most interesting facts came to light on the **examination of the pelvis.** As mentioned above, the greater part of the skeleton of the pelvis was found somewhat broken, yet preserved in the chief parts, so that the actual assembling and reconstruction of the whole pelvis could be carried out with sufficient certainty in all essentials. It is true that os sacrum was broken opposite the III sacral segment, but the correct form and position of the bone could be reconstructed, the fracturing lines being joined and covered with "plastiline", no actual modelling of the surface was, however, attempted, as it was considered more important to strengthen the broken parts, still somewhat frail and brittle despite conservation, by a somewhat thicker coating of "plastiline" on the surfaces in the weak places. All the upper and lower part of the bone was otherwise well-preserved and the articular surfaces uninjured; it was especially of decisive importance that the facies auriculares in both articulationes sacro-iliacæ were perfectly well preserved in all essentials, so that the correct articulation of both massæ laterales ossis sacri with the two ossa coxæ, whose corresponding articular surfaces were also well preserved, could be determined with absolute certainty. To replace the lacking articular cartilage and make sure of the correct position and cohesion in the sacro-iliacal articulations, the articular surfaces were covered with a layer of „plastiline" corresponding to the cartilage in thickness, whereupon their correct position to each other was checked, and the connection thus procured was made secure by placing thick "plastiline" masses behind, between os sacrum and os ileum, corresponding to ligam. ileo-sacralia post. et interossea. On the top and in front were placed thinner layers of "plastiline" corresponding to the average thickness of the ligaments. Cp. pictures Tabula VII—X.

Thus the entire posterior wall and the essential part of the lateral walls in pelvis major and pelvis minor had been reconstructed with great certainty. On the right side the whole of os ileum was well preserved, on the left side the inferior, posterior and anterior parts of ala ossis ilium were preserved. Superiorly and anteriorly the remainder had been so frail that it had been partly destroyed in the excavation and the journey and removal from the dress. The inferior part of ossa coxæ — the os ischii, was so well preserved in the bones of both sides that the position and size of tubera ischii followed with perfect certainty, only in more superfical parts lesser defects had to be filled with "plastiline". In the same way the chief parts of ossa pubis, especially both the parts by symphysis pubis, besides ramus horizontalis and ramus descendens pubis were found, so that also the anterior part of the pelvic girdle could be reconstructed with sufficient certainty.

We note that both acetabula were well preserved as well as the articular surfaces of the symphysis. (Fig. 28—31).

During the reconstruction it was repeatedly tried whether another position of both the ossa pubis either mutually or in relation to the other part of os coxæ might just as well be assumed as the position figured. Repeated experiments showed that the final position figured, including hereunder especially the breadth of the symphysis, was the only one that gave anatomically correct relations between the connection of the components, and we point out that the ends of the bones at the symphysis on both sides extend some way into the "plastiline" mass which is seen, and which is to represent the ligaments. The uppermost parts medial to tuberculum (spina) pubis were somewhat chipped in parts, but the articular surface below was preserved. The height of the symphysis could thus be determined with sufficient certainty, as also the breadth — and in this respect it is worth emphasising already here that, as the upper transverse diameter of the pelvis is rather large and the alæ ossis ilium plainly enough lie somewhat flatly, this corresponds with a somewhat broad symphysis.

For greater convenience during the reconstruction a rather soft "plastiline" was used, which certainly hardened to some extent, but, as it was subsequently found, not so much as it was expected. During the reconstruction work the various parts were supported by an assistant. The reconstruction accomplished, the pelvis was rather frail, it had therefore to be handled with caution and was placed in a special thread-basket. If it had been a normal pelvis, a firmer reconstruction mass could more easily have been employed, and the individual bones reconstructed separately, but as it soon became clear that a pathologic pelvis was at hand, it was necessary, in order to be able to check the correctness of the reconstruction step by step, to build up the pelvis connectedly from the solid posterior wall and lateral walls. When the reconstruction was concluded a series of photographs were taken in $^1/_3$ natural size, $^5/_{12}$ nat. in **Tabula VII** fig. 22—23 in order to secure sufficient distance and prevent too great perspective incorrectness. The pelvis had to be photographed in its thread-basket (which was subsequently taken out on the photos), and special care has been taken to reproduce such pictures as show the most characteristic facts. Fig. 22, 23 are $^5/_{12}$ nat.

As the 5th lumbar vertebra forms promontorium with the 1st sacral vertebra, it is placed on os sacrum; it also plainly evidences the presence of a deformity in the vertebral column, as is indicated, too, by the shape of the pelvis.

Before we proceed to the description of the main features of the pelvis, we give the **measurements** of the reconstructed pelvis which we have been able to take with a sufficient degree of certainty. For comparison we give the corresponding normal average measures for the female pelvis found in the Danish textbook of obstetrics (by Leopold Meyer),[1] in all essentials the same as in Stadfeldt & Ingerslev's and E. Hauch's (and with slight alterations in German and English Obstetrics. On conditions in the pathologic pelvis, see besides these the larger works on obstetrics.[2]) In this connection we shall not of course enter further into this question.

Other measures of interest are:

Table 4. Measures of os sacrum. (Case I.)

Herjolfsnes (Ikigait) I. Length of os sacrum measured from the ant. borders of the upper and lower surfaces.	10.9 cm.
Breadth of os sacrum measured on the most projecting parts of alæ ossis sacri.	12 cm.

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[1] Leopold Meyer, Det normale Svangerskab, Fødsel og Barselseng, Copenhagen 1891.

Leopold Meyer, Lærebog i Fødselshjælpen, vol. I—II, Copenhagen 1914—15.

E. Stadfeldt og E. Ingerslev, Fødslens og Barselsengens Patologi, Copenhagen 1889.

E. Hauch, Haandbog for Jordemødre, Copenhagen 1919.

[2] Ahlfeld, F., Lehrbuch d. Geburtshülfe, 1896.

Bumm, Lehrbuch d. Geburtshülfe, 1912, with excellent illustrations and text.

v. Winkels, Handbuch d. Geburtshülfe, vol. I—III, 1903—07.

Dœderlein, Handbuch d. Geburtshülfe, vol. I—III, 1916—21.

Clifton Edgar, J., The Practice of Obstetrics. Fifth Edition, New York—London 1916.

Table 3. Dimensions of Pelvis (♀) normal, and of Case I.

Normal Measures of the Pelvis ♀ in Centimetres.	Measures of Herjolfsnes (Ikigait) I. in Centimetres.
Apertura pelvis superior.	Apertura pelvis superior.
Diameter recta 10.5.	ca. 11
— transversa 13	ca. 14.6
— obliqua } 12 à	sin. 14
— — } 12.5.	dext.13.7.
Cavum pelvis	Cavum pelvis
Diameter transversa between Spinæ ischii 10.5	under 9 cm. in reality somewhat less as Spinæ ischii were somewhat chipped, nearer 8.2 cm.
Diameter between acetabula, pelvic aspect.	. . . . ca. 12.5 cm.
Apertura pelvis inferior	Apertura pelvis inferior
Diameter recta (to the lower end of os sacrum) ca. 11	at most ca. 8 cm.
Diameter transversa between tubera ischii ca. 10.5	ca. 8 cm.
The sizes mentioned are slightly diminished by the soft parts on the inferior wall of the pelvis.	The height of the symphysis is ca. 3.5 cm. The transverse external distance between the bottom of the right and left acetabulum is ca. 13.5 cm.

Compared with its length the os sacrum in question is relatively narrow, index sacralis is abt. 1.10, while in women of Northern Europe an average index sacralis of 1.16 (with individual variations) may be reckoned with. We must, however, at once emphasise that the relatively long and narrow os sacrum is a characteristic of the pelvis having a funnel-shaped contraction in the inferior aperture.

If we look at the pictures of the pelvis Tabula VII fig. 22—23 seen from above and a little from behind (to show a little more of the anterior wall), it will easily be seen that it is a pelvis that is rather large in the superior aperture and asymmetric. In the picture which is reduced to $^5/_{12}$ natural size the sagittal plane and the transverse frontal plane are given in heavy line; the sagittal plane is laid approximately through crista sacralis media, the transverse frontal plane perpendicularly to it, passing through the most lateral part of linea terminalis on the right (well-preserved) os coxæ. Hence, in the picture the transverse (frontal) plane passes through both the spinæ ischii and a little behind the ant. border of the 5th vertebra lumbalis. Thus the transverse plane and the sagittal plane divide the pelvis in such a way that the asymmetry plainly appears.

In the picture are further shown the chief diameters measured on the reconstructed pelvis: in the superior aperture: Diam. transversa (= 14.6 cm.) giving the greatest transverse diameter; from promontorium to the middle of the upper edge of the symphysis behind: diameter recta (= 11 cm.), by which it should be noted that the anterior edge of promontorium which is here reckoned coincident with the upper anterior border of I sacral vertebra is concealed in the picture by the anterior part of the 5th lumbar vertebra. The border of I sacral vertebra is shown at some distance behind the anterior outline of the wedge-shaped deformed 5th lumbar vertebra.

The figure further shows the diameter transversalis in the inferior aperture between the tubera ischii (8.3 cm.).

The pronounced asymmetry and oblique deformity appear very clearly. As the measures show, there is no contraction in the apertura superior. There the diameter recta is almost normal, if anything a little larger. The diameter transversa, however, is larger (14.6 cm.) than the normal average (13 cm.).

Of the oblique diameters the right one (reckoned from articulatio sacro-iliaca dext. obliquely forward to the left eminentia ileopectinea) is 13.7 cm., the left one a little larger (14 cm.). The normal measure is 12—12.5 cm. and normally the right oblique diameter will be a little larger than the left, the opposite of what is the case in the pelvis Ikigait I. The transverse and the oblique diameters are somewhat larger than normal, diameter recta, if anything, a little larger. In accordance herewith, in pelvis major ossa ilii are somewhat flatter and more outward directed than normally, which is plainly seen on the right well-preserved os ileum (compare the picture of the pelvis seen from before Tabula VII fig. 23).

In the lower part the pelvis is contracted; in cavum pelvis it is not fully 9 cm. between the somewhat chipped spinæ ischii, against the normal 10.5 cm. The contraction is greatest in the inferior aperture, viz. diameter recta only 8 cm.(!) against the normal 11, and diameter transversa 8.3 cm. against the normal c. 10.5 cm. In the picture the lower point of os sacrum is concealed just under the upper anterior border of the 5th vertebra lumbalis (the white point indicating this. The height of the symphysis pubis is abt. 3.5 cm. It is further seen how symphysis pubis is distinctly displaced towards the left; the right side of the pelvis is reduced, the left side enlarged; the right linea terminalis is less curved, the left linea terminalis more outward curved and more backward directed on the left side than on the right side; also os sacrum (with the 5th lumbar vertebra) has rotated somewhat towards the left. In the picture (Tabula VII fig. 23) showing the pelvis from before at a lesser angle of inclination than in the normal erect position, the asymmetry is very plainly seen, as also the oblique position of os sacrum, and especially how the left os coxæ is somewhat smaller than the right, as it may already be seen from above but especially from before. Thus the smaller size of tuber ischii sin., and on the whole the shorter extension of the left os coxæ from tuber ischii to the superior border of margo acetabuli is very striking.

Summing up all the features mentioned above our diagnosis of the shape of the pelvis will be as follows:—

Asymmetrical pelvis, slightly enlarged in the superior aperture, having a **funnel-shaped contraction in the inferior aperture.**

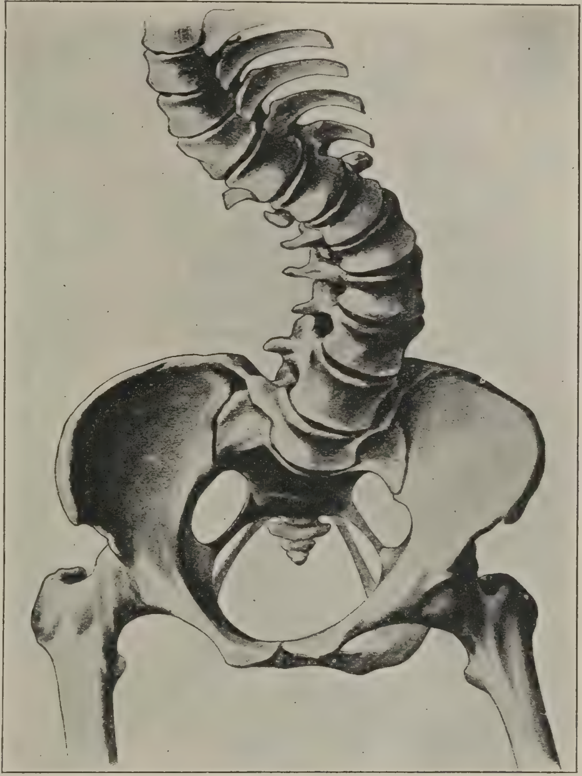

Fig. II. Scoliotic asymmetric pelvis. (Bumm).

The causes of this shape of the pelvis merit more detailed mention. In the first place the deformity found in the vertebral column (scoliosis) may be a contributary but not the chief cause of the asymmetry, see picture in the text fig. II of a scoliotic asymmetric pelvis (from Bumm's Lehrb. d. Geburtshülfe. 1912. Fig. 398), since an ordinary scoliosis must reach very high degrees before it causes a serious deformity of the pelvis. The very pronounced displacement of the right half of the pelvis (Case I) towards the left side which becomes more concave internally, whereas the right side becomes more extended and, as it were, more pressed in towards the pelvis, and the relatively smaller development (atrophy) of the left half of the pelvis, show, in conjunction with the other features, that we have to do with causes working partly analogically with those that produce the so-called coxalgic asymmetrical pelves. When at an early age one of the inferior extremities is totally or partly injured in its function, the pelvis will receive a greater pressure in acetabulum on the sound side than on the affected side, and the consequence will be that during development and growth that part of the pelvis which corresponds to the sound lower extremity will, as it were, be pressed more towards the middle than the affected side. The sound side of the pelvis (in this case I, the right side) will become contracted, while the pelvis on the affected side will become enlarged, and the symphysis will be pushed to the same side, the left. Now, as neither articulationes sacro-iliacæ (dext. and sin.) or articulationes coxæ (dext. and sin.) show any sign of disease, and as we can see from the preserved right femur that, in accordance with conditions in the right half of the pelvis, it was sound, as was also the right knee-joint, there must have been an affection of the left inferior extremity, either in the joints below the hip — such as the knee-joint or the joints of the foot, — or some other affection such as a limp, a badly healed fracture of the legbones during early age, or osteomyelitis, talipes, paralytic affections etc. As no part of the left inferior extremity below the hip-bone is preserved, no more details can be gathered from the skeleton alone.

The asymmetry of the pelvis, however, points decisively to a reduced functional ability in consequence of some affection of the left inferior extremity, while the right extremity must have been sound. This explains the asymmetry in the main. The other feature of the deformity was the funnel-shaped contraction in the inferior aperture. The causes of this contraction without kyphosis are as yet far from sufficiently elucidated, as I am informed by Professor Dr. E. Hauch, chief obstetrician of the Maternity Hospital. Stadfeldt and Ingerslev state (1889, p. 111) that only little was known about the cause of the funnel-shaped contraction without simultaneous kyphosis, but that an English obstetrician had found it comparatively frequently in ladies of his country, and that he was inclined to think that the frequent occurrence of this shape of pelvis in England was due to the national custom of letting young girls ride much at an early age. Stadfeldt and Ingerslev do not think it can be denied that riding may re-form a young, as yet "plastic" pelvis to the funnel shape, but that a disposition to a diminished pelvis must no doubt simultaneously be present if the contraction mentioned is to become considerable. Whether such features[1]) may perhaps also have been present in Herjolfsnes (Ikigait) I besides those subsequently mentioned, it is impossible to say, but I have thought it desirable to call attention to the possibility.

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[1]) The presence alone of six sacral segments is no satisfactory explanation either.

But there is another possibility — we might conjecture that the scoliotic curvature of which we have found undeniable signs in the vertebral column also involved or was connected with a kyphosis, in the present case a low-seated kyphosis. From the shape and condition of the pelvis and os sacrum, however, we may with a very high degree of probability pronounce an opinion as to the presence of a greater or less kyphosis in conjunction with scoliosis, i. e. in this case a kyphoscoliosis. The pronounced deformity in stature and the external form of the back and especially in the pelvic and hipregions are very well shown by the two inserted pictures (reproduced from Bumm's Lehrb. d. Gebh. 1912.) representing text-fig. III back and pelvis from a kyphoscolicotic woman and text-fig. IV a woman with kyphotic contracted funnel-shaped pelvis as in the case Herjolfsnes (Ikigait) I. A comparison between the pictures and the corresponding dress, No. 39 (see Dr Nörlund's work: Buried Norsemen fig. 64 and 69) is very striking. — It is

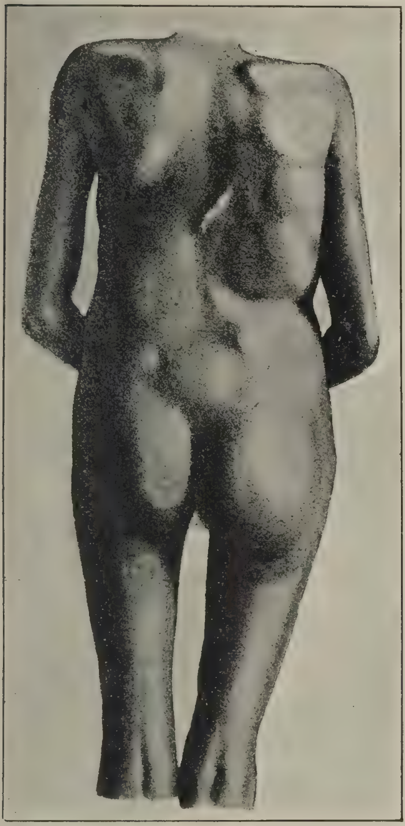
Fig. III. Back and pelvis of a kyphoscoliotic woman.
(Bumm).

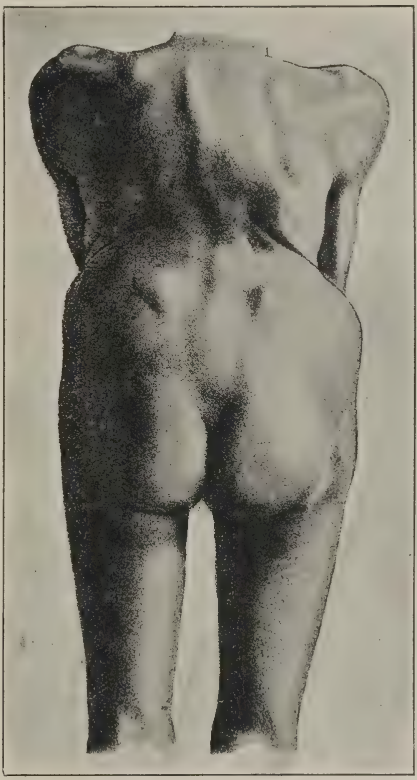
Fig. IV. Back and pelvis from a woman with kyphotic contracted funnel-shaped pelvis. (Bumm).

a well-known fact that, while a common high-seated kyphosis need not cause a contraction in the shape of the pelvis (cp. the proverb "the humpbacked are easily delivered"), a low-seated kyphosis in the upper lumbar region or the lower thoracic region may affect os sacrum and cause a deformation of the pelvis, especially a contraction of the transverse diameters inferiorly, so that the tubera ischii and the spinæ ischii take a more medial position while the upper part of os sacrum is pressed backwards and its lower apex — (with the coccygeal bone) in several cases turned forward. Such a contraction both of the transverse diameter and often, too, a diminishing of diameter recta inf. in the inferior pelvic aperture (cp. e. g. Bumm's Lehrbuch d. Geburtshülfe 1912 chap. XXII) combined with some enlargement of the superior pelvic aperture is a characteristic of the kyphotic pelvis having a funnel-shaped contraction. The increase especially of diameter transversa in apertura superior pelvis is explained by the fact that there is an attempt to move the centre of gravity of the upper part of the body more backwards in order to counteract the drawbacks attaching to the kyphotic curvature, which displace the centre of gravity forwards. The upper part of os sacrum will then receive a pressure (or pull) in a backward direction, by which the lateral parts of os sacrum will be pressed more backward between ossa coxæ so that the lateral parts of these will be pressed wider apart to the sides, which will involve an increase of the upper transverse diameter. The anterior ends of ossa pubis will show a tendency to separate more from each other, by which symphysis pubis will become broader exactly as it is the case in the present pelvis Herjolfsnes (Ikigait) I. In the inferior aperture, on the other hand, the tubera ischii will approach each other and the transverse diameter will become shorter, the inferior end of os sacrum (and os coccygis) will come more forward (in contrast to the superior end), i. e. inwards towards the pelvic cavity by which the diameter recta inferior will also become smaller (shortened) exactly as in the pelvis Herjolfsnes (Ikigait) I.

After this analysis of the changes in the shape of the pelvis in the case at hand it will be of interest to make further examination of **the bones** which compose the pelvic girdle in Herjolfsnes (Ikigait) I. The two ossa coxæ have already been mentioned, and it was pointed out that the left os coxæ was perceptibly smaller than the right, especially that os ischium was shorter, from which followed that tuber ischii sin. was placed considerably higher up than the corresponding tuber dext. This will easily be seen from the picture Tabula VII fig. 23, compare also the shape of foramen obturatum fig. 28—31.

Os sacrum, however, merits more detailed mention. The length 10.9 cm. and the breadth 12 cm. have already been mentioned. Index sacralis = 100 times the breadth divided by the length, was 110, while the average European index is 112 for males and 116 for females.

This shows that os sacrum is comparatively long (just what it will be with this shape of pelvis) but this alone does not explain the conspicuously low index for a woman. A complete explanation of the low index (which also obviates the possibility that in spite of all a male type should be assumed) lies in the fact that os sacrum in Herjolfsnes (Ikigait) I has 6 sacral segments instead of 5, just as there are 5 foramina sacralia. The study of os sacrum shows that the sacral formation is certainly displaced to some extent cranially, but that there is no question here of a simple assimilation of a lumbar vertebra, for the 1st and 2nd sacral vertebræ have an appearance that answers well to their name and the bone reminds one most of an os sacrum with an included I vertebra coccygea. We are, however, in the fortunate case that the actual 1st vertebra coccygea was found lying detached and in very good preservation, (see the illustration Tabula XI fig. 32) at the lower end of os sacrum, and likewise the 2nd vertebra coccygea separated from but fitting the 1st vertebra coccygea, corresponding with the pelvis being female. Hence it can conveniently be regarded as if a 6th distally situated sacral segment were added to the os sacrum, and thus it is explained that the relative length of the female os sacrum has been correspondingly increased. By itself this circumstance will, however, only explain part of the reduction of the diameter recta in apertura inferior. For if index sacralis was to have had the normal female average in this case the total length should have been 10.4 cm. with a breadth of 12 cm., of the difference here only a fraction could be added to the figure for diameter recta inferior.

Os sacrum shows considerable asymmetry answering to the above-described deformity of the whole pelvis. The upper part of the left massa lateralis (ala) stands somewhat lower, is hardly as powerful as the right. The upper part of the bone has rotated considerably to the left, and the anterior face is somewhat flat upwardly. The connection between the 1st and 2nd sacral segments is somewhat more projecting, there is an indication of a double promontorium, the 1st vertebra sacralis being, as it were, drawn a little upwards and backwards which is also evidenced by the linea terminalis on alæ ossis sacri not being quite sharply marked. It runs in a more flattened way towards the 1st vertebra sacralis but also somewhat towards the 2nd. The real (true) promontorium, however, is situated opposite the upper border of the 1st vertebra sacralis resp. discus intervertebralis between this vertebra and the 5th vertebra lumbalis, as will be seen in the picture. The whole of this appearance shows most plainly the effect of the assumed kyphosis higher up in the vertebral column.

As a further feature we find that the concrescence between the corpora of the 1st and 2nd sacral vertebræ is certainly complete in front where there is a distinct smooth thickening of the osseous substance anteriorly, but the concrescence is less complete at the sides of the corpora where the remains of the discus between the two sacral corpora shows as a fissure. In the massæ laterales the concrescence is complete.

Of interest are also the measures of the articular surfaces, of facies auriculares on the right and left sides of os sacrum.

The articular surfaces on both sides are well-preserved, smooth, and entire, without actual morbid changes, no signs of caries or exostoses at the edges of the articular surfaces— this held good too for the corresponding articular surfaces on os coxæ fig. 28—31. Facies auriculares extend right from the 1st sacral segment over the 2nd and 3rd segments both on the right and left sides. On the right side the articular surface is longest, viz. 66 mm., the breadth is 27 mm. On the left side it is well-preserved in a length of 56 mm., but a little of the lower part of the face is chipped off; it is, however, shorter (60 cm) than on the right side, the breadth is 24 mm., thus narrower than the right; the corresponding articular surface measured on the left os ilium measures 60 mm. in length. We note that the lower part of the left facies auricularis on os sacrum is situated a little more posteriorly than at the right facies auricularis. The concrescence of arcus vertebræ on the back of os sacrum is quite complete, the upper processus articulares have the character corresponding to a true sacral vertebra I. Crista sacralis media is not particularly strong. The sacral canal must have been comparatively not large, apart from the fact that the upper part of the arcus of the 1st and 2nd sacral segments has been pressed somewhat forwards during the exhumation of the skeleton. Hiatus sacralis inferior is not large, the synostosis between the arcus is complete.

The space between tuberositas ilei and tuberositas ossis sacri is rather low (corresponding with the altered mechanical conditions in columna vertebralis). It is not excluded that the upper foramina sacralia posteriora on the left side may have been somewhat constricted.

Angulus sacralis inferior sinistra is somewhat broad, as it were more extended (traction of the inserted strong ligaments) than on the right side. The inferior face on apex of the last sacral vertebra is smooth without any indication of synostosis with the 1st coccygeal vertebra. The measures for this inferior facies coccygealis are 16 mm. in transverse and 10 mm. in sagittal direction.

The measures for the superior face of the corpus of the 1st sacral vertebra are 66 mm. in frontal, 36 mm. in sagittal direction. Of this face it must be noted that the border-part to the left a little anteriorly, laterally, and a little posteriorly is somewhat more elevated, while the left part of the 5th vertebra lumbalis here is correspondingly specially strongly compressed from above downwards.

In this connection **the 5th lumbar vertebra** see (pictures Tabula IV—VI) merits supplementary mention, in addition to the measures which have already been stated. The whole of the left border of corpus vertebræ is much compressed from above downwards, so that on the most lateral part left it only measures abt. 1 cm. in height and posteriorly on the left only 7 mm. The anterior and lateral facies of corpus vertebræ is in consequence hereof reduced to a horizontal furrow extending on to the posterior face and especially narrow on the left side. (See fig. 16—21).

The arcus region with the processus articulares is well preserved in the lower part, but upon exhumation of the skeleton was broken off from corpus just where radix is fastened to corpus. Arcus is rather low, somewhat oblique. As the left radix (pedicle) springs from the posterior face of corpus the radix is reduced to a quite thin (1 mm.), almost horizontally placed bone plate. On the right side radix is somewhat less compressed, though flattened from above downwards. Processus articulares inferiores have the appearance and position corresponding to that of a 5th lumbar vertebra to the upper articular surface of os sacrum. There has been no synostosis in the joints, neither downwards nor upwards. See figures 14, 15, 16, 19, 20 and 21 on Tabula IV—VI).

We receive the quite definite impression, however, that at any rate the 5th lumbar nerve, and probably also the 4th lumbar nerve on the left side must have been subjected to rather considerable compression, for foramen intervertebrale is not large and to this must be added the fibrous ligamenta, cp. also the deep sulcus fig. 19, 15 on the bone resulting from compression of the left 5th lumbar nerve, when it passes through the foramen intervertebrale. Pictures of further details from the 5th left lumbar vertebra are found in fig. 14—16 and 19—21. The possibility must then be considered that in addition to possible disturbances from *cauda equina* and the sensitive innervation, an essential part of the muscles of the left hip and inferior extremity which are innervated from the 4th and especially from the 5th lumbar nerve, may also become more or less affected, when the spinal nerves that send out nerve-fibres to the muscles are subjected to chronic compression with partial atrophy of nerve-bundles from pressure and diminution of the number of nerve-fibres. Among the muscle-groups which may especially become affected by a weakening we shall mention some: of the hip-muscles m. glutei (max., med., min.) partly but in less degree ileopsoas and the extensor muscles on the femur (quadriceps femoris), still more the flexor muscles on the femur (biceps cap. breve, semitendinosus, semimembranosus), and adductor magnus and obturator ext. On crus both the extensor muscles, m. peronei, and some of the flexor muscles will be affected, on the foot both extensor digitorum brevis and some of the flexor muscles of the foot (for details see the textbooks of anatomy). In short, this too will afford a possibility of explaining that reduction of functional capacity of the left inferior extremity — as opposed to that of the right side —, which we already said above must have been present because the asymmetry of the pelvis proved this to be just such a so-called "coxalgic pelvis". The articulations of the pelvis were not affected, nor was the left hip-joint. Now even if the whole of the skeleton of the left inferior extremity is lacking, and even if we know no thing certain of the total extent of the kyphosis, we have received an indication as to where we may look for an obvious cause of the above-mentioned chronic reduced function of the muscles of the left inferior extremity.[1] Any one who knows the effect of the innervation of the numerous important muscle-groups mentioned will understand the importance hereof. There has thus in all probability been a weakening of the muscles of numerous important muscle-groups of the hip, femur, crus, and foot. With regard to the hip-joint both the abductors, the extensor muscles in the hip-joint and the adductors have been affected. As regards the kneejoint the extension partly though in a less degree, but especially the flexion have been affected. With regard to the ankle-joint and the foot-joints both the muscles that bend (i. e. stretch the tip of the foot distally) and especially also those that stretch dorsally (i. e. bend the foot upwards by the ankle-joint and stretch the toes) may be affected, and finally also some of the short muscles of the plantar side of the foot.

What we are specially thinking of is a reduction of the number of nerve-fibres and in consequence hereof a reduction in the number and size of muscle-fibres in the affected muscles, which means that the muscles will become thinner and weaker, perhaps some will become specially reduced.

We have thus also received an indication as to how we should explain e. g. that difference in the thickness of the right and left femur we found so pronounced especially in the case of Herjolfsnes, (Ikigait) XV, and XX. With these weak or very little powerful skeletons we have shown in several of the finds from Herjolfsnes (Ikigait) there is every possibility that a deformity, e. g. scoliotic — in certain regions of the vertebral column as found on these skeletons may have caused a pressure on the corresponding spinal nerves with concomitants of various sorts both with regard to the motoric, vasomotoric, the sensitive and nutritive functions in the small, weak, often underfed individuals. Such pathological influences on the nervetrunks are well known.

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[1] Cp. with this that other skeletons XV, XX from these finds show a perceptible difference in the size of the thigh-bones and patellæ of the right and the left sides.

The extent and exact form of the kypho-scoliosis we cannot elucidate beyond what has already been said (see also the pictures of the deformed vertebral corpora from the middle and lower dorsal region of columna Tabula II—III). On the other hand we understand very well how the "sound" right inferior extremity has borne a greater part of the weight of the body. It must be taken for granted from the deformity of the pelvis that the affection must have begun in youth, hardly in childhood, must have been seated in or near the region of the upper lumbar vertebræ. According to more recent statistics this portion of columna is comparatively often affected with spondylitis, just as in this affection the weight of the upper parts of the body acting on and supported by the lower portions of the vertebral column increases downwards and so will more quickly give clinical symptoms.

In this connection it would seem natural to consider which of the two frequent causes, **rhachitis** or the **tuberculous spondylitis,** might be supposed in the case under consideration. As this question has been again and again considered by me during the process of this investigation, and as hardly any of the two possibilities may a priori be said to be more probable than the other, we shall enter upon the question under all reserve. With the exclusion of the vertebral column, neither the bones of the pelvis nor the preserved right os femoris show actual sure signs of rhachitis, especially if we compare the femur with the femora from cases II, XV or XX, which show several indications of rhachitic influence, see tabulæ. It is true that a kypho-scoliosis seated similarly to the one here assumed, might very well be due to rhachitis, but it would not be unjustifiable to imagine the other equally obvious possibility, a tuberculous spondylitis perhaps combined with some previous scoliotic deformity of columna, as a serious ætiological factor. Just the influence of the kyphosis appears from the shape of the pelvis, and from the preserved parts of the vertebral column we can see that there must have been a kypho-scoliosis of no inconsiderable extent, cp. the pictures of the lumbar vertebra and the middle lower dorsal vertebræ; also other dorsal vertebræ show obvious deformities, see Tabulæ II—VI. If we assume that this affection, with or without a rhachitic basis, commenced at a not too late period in the youth of the individual, while the bones of the pelvis were still "plastic" and suceptible to the changed mechanical influences consequent upon the deformity of the vertebral column and the weakening of the muscles of the left inferior extremity, the result at hand may very well be assumed to have appeared. For other reasons too, thus from the whole comparatively good development of the bones of the pelvis and especially of the right femur, we may conclude that the woman in question, even if she was not tall, must have been fairly well developed compared with several other individuals from the cemetery at Herjolfsnes (Ikigait) and, apart from the diseased parts, not so degenerated as several of the other individuals. It may perhaps be denoted as a not unlikely possibility that a tuberculous spondylitis was present (cp. the appearance of the vertebral corpora Tabula II—III esp. fig. 8—13 magnified $^4/_3$ × nat. size). Whether this can have been the cause of death, whether a compression of the lower part of medulla spinalis at the level of the 1st and 2nd lumbar vertebræ may have occurred, or of cauda equina, whether possibly congestion abscesses (without perforation to the hip-joint!) may have formed, are matters for conjecture. In this connection I shall call attention again to the mass of fatty acids found posteriorly in the pelvis. It is a well-known fact that if the nerves and medulla spinalis are involved in the affection, there may sometimes occur symptoms with paralysis of rectum and the bladder (incontinentia alvi et urinæ); I mention this latter fact as a feature which hypothetically might perhaps be related to the peculiar finding in the pelvic bones of this woman which will be described in more detail below. For it could be shown that a piece of sealskin had been lying from the front of mons pubis between the femora, passing before genitalia and anus up behind os coccygis to the sacral region, remains of sealskin being found adhering to these places (in addition to human perineal hairs), together with the remnants of a twisted woollen cord (or string) which had evidently been fastened to the sealskin in front on mons pubis and behind in the sacral region. Besides loose hairs of undyed light sheep's wool the remains of fibres of plant substance (hemp?) were also made out. It is an obvious explanation that the woman may have worn a kind of protective bandage before pudenda and anus perhaps to soak up secretions during a possible incontinence. Otherwise we know nothing about a special article of clothing for this region among the women of the time, and the most probable assumption is that, as in the earliest times and the Middle Ages, and indeed even much later, drawers were not worn by most European women either of the higher or the common classes.

Another comparison might be made with the clothing of the Eskimo women, but there is hardly any reason, we may believe, to assume an analogy in that quarter.

A question which we shall finally touch upon is, whether the contraction of the pelvis which we have shown, was in its nature and degree of such a kind that the woman in question could have **borne children,** i. e. whether accouchement could take place "per vias naturales". From the dimensions and shape of the pelvis it appears that there is a considerable mechanical disproportion at any rate in the inferior apertura pelvis eventually causing maternal dystocia, obstructed labour, from pelvic deformity. The measures in question lie at 8 cm. both for diameter transversa and especially for diameter recta. If this reduction of the diameters, for diameter recta alone, lay in the superior pelvic aperture, it would, as we know, lie just by or rather below the limit for the birth of a livnig child per vias naturales even with obstetric aids. If in the inferior aperture, the chances are on the whole a little better. It depends in part upon how much we may assume the pelvis capable of expanding during the birth. But in a case like the present where there is great contraction especially in diameter recta (where we have not even reckoned with os coccygis), and with a relatively long os sacrum with 6 segments, we may assume it to be **quite precluded that this woman could have given birth to a living child per vias naturales,** and especially as here without skilled obstetric aid.

We must, however, note the circumstance that the weights and the heads of the children might have been comparatively small (or not fullgrown, cp. also the small measures of the child-coffins chapt XII), for it is striking how small the adult skulls were, as will be exemplified in the following. The preserved pelvic bones from other cases point to small individuals, too, (who may, however, in the case of females have rather large pelves). It is at any rate peculiar that so many of the skeletons showed signs of deformities, and it is hardly accidental that the two only fairly well preserved female pelves from the old Norse colony, Herjolfsnes (Ikigait) I and II, were pathologically contracted each in its own way!

If the woman in question became gravid, she would probably have no prospect of being delivered, she herself and the child must die, unless cæsarean section could be carried out after the death of the mother, an operation which was sometimes performed even in those times. Sometimes the child would survive. To meet all contingencies the skeletal material was carefully examined, but no remains of the bones of a fullborn fætus were found, nor could this be expected considering the slight degree of resistance to decomposition in the earth which the bones of the fætus would have.

Referring the reader to the sources I have mentioned in my work "De ældste Kongegrave og Bispegrave i Roskilde Domkirke", Copenhagen 1914, I shall quite briefly give some general data regarding the performance of **sectio cæsarea.** Both among the ancients and in the Middle Ages sectio cæsarea was only performed on the dead or dying mother in order to save the life of the child. The Church repeatedly urged the duty of executing the Cesarean operation on the dead mother to save the child for baptism. Now and then we hear accounts of persons who were thus brought into the world, "cut out of the mother's womb" as it says. In the 10th century are mentioned one Count BURCHARD VON LINSGOW, subsequently abbot of St. Gallen, and a bishop of Constance, Count GEBHARD VON BREGENZ, from the same period; both are called "Cæsones". The section was made with a razor, either (as stated in "La grande Chirurgie" de GUY DE CHAULIAC (1363)) longitudinally a little to the left of the median line of the abdominal wall (to avoid the liver), or later, in the median, in "linea alba", from processus xiphoideus to the symphysis, whereupon the child was pulled out through the opening.

Even the earliest cases of Cæsarean section stated to have been performed on living women must in reality be regarded as laparatomies carried out in extra-uterine gravidity. The first undoubted Cæsarean section performed on a living childbearing woman "in labore" dates from 1610. A particularly famous case of this operation on a dead woman dates from the middle of the 14th century. The powerful Swedish nobleman, the Lord High Constable ("Drost") BO JONSSON GRIP, ordered the Cæsarean section to be made on his first wife when she died in child-birth, in order that he might inherit her when it was thus proved that the child had survived the mother. It sounds remarkable, then, and quite opposed to the custom of the Church, when a decree was issued in Iceland in 1345[1]) prohibiting the practice of cutting the child out of the dead mother, but ordering her and her child to be buried in the churchyard like others. Probably the custom was abused so that the Cæsarean section was too often performed on a childbearing woman merely in a swoon or a state of asphyxia, which might easily occur considering the defective signs of death of that time. From some of the accounts in the Sagas (see e. g. Grønlands historiske Mindesmærker, Eric the Red's Saga I p. 234—35 about Thorstein Eiriksson and Guðrið and others) it appears that when the supposed dead awoke from their state of suspended animation, they were evidently taken for ghosts and treated more or less well in consequence.

We must then probably reckon with the probability that the Cæsarean section was sometimes, perhaps not rarely, performed on dead or apparently dead childbearing women in the Norse colonies in Greenland. Obstetric aid in the true sense beyond what experienced women could render, could not of course be had. If we were to judge of the probable frequency of too small, respectively deformed and contracted, pelves, thereamong rhachitic and others, from the finds here, **we cannot**

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[1]) See Diplomatarium Islandicum vol. II.

preclude the possibility of a high death-rate for mother and child at birth as a concomitant cause of the extinction of the Norse colonists at last.

The question of the **extension of tuberculosis** in those days is also an old and much debated problem about which only comparatively little is known. The earlier view that tuberculosis (more especially of the lungs) was as good as unknown in the North in the early Middle Ages is hardly tenable, but it must certainly be assumed that the great demands made on the health and strength of the population especially of the upper class (apart from servants, serfs, and the humbler class) during the Viking Age and the early Middle Ages, and the natural elimination of the weaker individuals consequent thereon, together with the more scattered settlement, much traffic in the open air, and inurement to exposure, must of itself have reduced the number of the tuberculous. If for instance tuberculosis of the lungs were to settle at a farm or in a village it might be imagined that in tracts with a scattered population this latter circumstance would act as a kind of natural isolation which could not, it is true, prevent the tuberculosis spreading in one locality and perhaps attacking and carrying away a great deal of the people there, but yet rendered it difficult for other localities to be infected. With regard to the early Teutons (Germans), philological researches seem to show so many words for hæmoptysis, consumption, phtisis, and other symptoms of disease and tuberculous diseases connected herewith that they must be regarded as evidences of an early extension of tuberculous diseases. The Norwegian medical historian FR. GRØN[1]) states this in accordance with MORIZ HEYNE[2]) and on the basis of various statements in early Norse literature. FINNUR JÓNSSON[3]) mentions briefly that lung- and chest-diseases were no doubt fairly frequent in the earliest times partly because of the bad sanitary conditions of the houses. But naturally they prevailed mostly among servants and humbler people who are not much mentioned in literature, hence the sparse historical records.

In my book "De ældste Konge- og Bispegrave i Roskilde Domkirke", I have myself[4]) collected various data in connection herewith, thus the results of the investigation of the Danish royal medieval tombs at Ringsted and Roskilde. It was demonstrated amongst other things that Queen Eleonora, who died abt. 20 years old in childbed two years after her marriage with Valdemar the Second's son, Valdemar the Young, had had an extensive tuberculous spondylitis in the lumbar region. As she was a Portuguese, daughter of King Alphons II of Portugal and Urraca of Castile and thus niece to Valdemar the Second's queen, Berengaria, she was no doubt fully developed at an early[1]) age (her height was at least 166 cm.). We may perhaps take it for granted that her tuberculosis of the lumbar vertebræ affected the size of the inferior aperture of her pelvis, and this would thus afford an explanation of a difficult birth and of the fact that she died in childbed (other causes may of course be imagined, but this seems most obvious). That contraction in the inferior aperture of the pelvis which may have been present in the case of Queen Eleonora could not possibly be recognised by the investigators of Ringsted Church in 1855, partly because the contraction (when not of a very high degree) can only with difficulty be recognised unless the pelvis is accurately reconstructed (as done in the case of Ikigait I and II), and partly because the special significance of a spinal deformity causing this form of funnel-shaped contraction of the pelvis was only fully recognised[2]) in obstetrics at a later date, and finally because a contraction of the pelvis in the inferior aperture was evidently not thought of at all when the deformity was not so conspicuous in the isolated bones of the pelvis, too, as to attract attention at the investigation in Ringsted by its obvious abnormality.[3]) In my work of 1914 I have also analysed various curious cases of deformities of the skeletons, thus a considerable scoliosis in Queen Estrid, a strong arthritis deformans in the elbow-joint and an abnormal gait in King Svend Estridsøn (thus an historical anecdote in which he is called lame is explained), and strong traces of arthritis in the vertebral column, thorax and knee-joints of Bishop Vilhelm's skeleton. As regards tuberculosis of the lungs I have mentioned in the same work p. 75 that the lung affection of Isac, a rural dean (ruralis sacerdotii præpositus) must have been either a strong chronic bronchitis (with emphysema) or tuberculosis of the lungs, especially since various features of Saxo's account renders probable the assumption of an acute exacerbation of the lung-affection passing into a galloping consumption.

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[1]) FR. GRØN, Altnordische Heilkunde. Janus 1907—8.

[2]) MORIZ HEYNE, Fünf Bücher Deutscher Hausaltertümer, vol. III. Körperpflege and Kleidung, Leipzig 1903.

C. p. also: M. HÖFLER, Deutsches Krankheitnamensbuch. 1899.

[3]) FINNUR JÓNSSON, Lægekunsten i den nordiske Oldtid, p. 40, Copenhagen 1912.

[4]) FR. C. C. HANSEN, De ældste Kongegrave og Bispegrave i Roskilde Domkirke, Copenhagen 1914 (Fol.).

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[1]) Otherwise it would not have been improbable that an undeveloped funnel-shaped pelvis might have been a factor. This must now be considered very little probable. In this connection we call to mind the tradition of the folk-song according to which Valdemar the Second's queen, Dagmar died in childbed after the Cæsarean section had been performed on her during the difficult birth while she was still alive. Perhaps it was an extra-uterine gravidity by which "a son was cut out of Dagmar's side". She had, however, borne Valdemar the Young.

[2]) Breisky 1865.

[3]) This is corroborated by the protocol (visum repertum) given in the note p. 327 f.

In addition to the cases here mentioned, which might be supplemented by terms (nicknames) indicating gibbosity or a hump, I may state that Professor C. M. Fürst[1] in his investigations of Swedish royal tombs from the Middle Ages in Vreta conventual church showed the presence of a strong tuberculous spondylitis in the lumbar region of the vertebral column in the skeleton of a humpbacked child aged abt. 8 years from one of the tombs.

Summing up these few conclusive cases (which will no doubt be added to, as the interest in and the expert examination of both ancient and medieval skeletons becomes more widespread), it appears that the tuberculous spondylitis (in the lumbar region) occurred among the higher classes[2], and there is hardly reason to believe that the lower

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[1] C. M. Fürst, När de döda vittna, Stockholm 1920.
C. M. Fürst och Martin Olsson, Magnus Ladelås og Karl Knutssons Gravar i Riddarholms Kyrkan, Stockholm 1921.

[2] About Queen Eleonore (Alienor), whose skeleton was mentioned in the work on the royal tombs in Ringsted Church (1858) we shall give the following data. She was the daughter of King Alphons II of Portugal and Urraca of Castile. King Valdemar II Sejr (of Denmark) who had been married for the second time to King Alphonso's sister Berengaria (d. 1221, her reconstructed facial profile is seen below in chap. VI p. 440) caused her niece Alienor, aged 18, to be brought to Denmark as the bride of his and his first queen, Dagmar's, son, Valdemar the Young, who had been crowned King as early as 1218. The nuptials were celebrated at Ribe in 1229 on St. John's day. Two years after she died in childbed on Aug. 28 1231. Three months later her husband was killed by an accidental shot while out hunting.

The examination of her skeleton, carried out in 1855 by Professor of Anatomy Ib Ibsen at the excavation of Ringsted Church, gave the following results: The age of the skeleton corresponded with the historical records. About the skull it is stated: The chin was pointed and prominent. In the upper jaw she had only two incisors and the 1st and 2nd molars, in the lower jaw only three premolars and three molars, all the other teeth were gone and the alveoli closed!

The dimensions of the skull were

Length	7	inches	(Danish)	c. 183	mm.
Anterior breadth, Frontal transversal diameter	$4^{1}/_{2}$	—	—	c. 118	—
Posterior —, Parietal transversal —	$5^{1}/_{2}$	—	—	c. 143	—
The face from the root of the nose to the lower edge of the chin	4	—	—	c. 104	—

Index cephalicus is thus abt. 78.

All vertebræ were present. In the corpora of all lumbar vertebræ there were very distinct traces of a caries (i. e. tuberculosis) developed for some length of time. This was considered the probable cause of her death.

The length of columna from atlas to os sacrum's point was $25^{1}/_{3}''$, ossa pubis injured (!), pelvis, however, of normal shape and spacious".

Hence, without a reconstruction a contraction in the inferior aperture of the pelvis could not of course be discovered; the superior aperture was spacious in classes should have been spared. It is quite another matter that the upper class proper, among whom physical culture and skill in the use of arms was so greatly valued, was no doubt subjected to a natural (and sexual) selection which tended to produce a race of high physical perfection and resistance to disease and vulneration. There is thus nothing remarkable in our finding symptoms of a funnel-shaped contraction of the pelvis combined with tuberculosis in the vertebral column among the degenerated Norse population in medieval Greenland. And I am of opinion that we may venture to regard the findings in this woman Herjolfsnes (Ikigait) I as the first well-proved case thereof. We shall subsequently see how in the same find there are at any rate two certain cases of rhachitis (II and XX) and probably more.

Of the rest of the skeletal remains from Herjolfsnes (Ikigait) I we note the **right femur** which is powerful, well preserved, and dark-brown in colour. As we mentioned before, it shows an infraction posteriorly, a little below the middle, which has not, however, altered its contour from before worth mentioning. Caput femoris is rather large and well preserved, the cartilage-coated part is quite smooth except for a slight post-mortem impression anteriorly (the cartilage is absent). Fovea capitis is rather larger and elongated posteriorly. Tabula I and XII.

Collum is short and broad. Trochanter major not very large, its apex lies on a level with the centre of caput. Trochanter minor is powerful and crista intertrochanterica well-marked. The traces of the fibrous sheath of the hip-joint are well marked especially inferiorly. Corpus is fairly powerful and seen from before only slightly concave medially, with some indication of platymery in the upper third. Linea aspera is rather prominent opposite the middle third. Extremitas inferior shows a medially and inferiorly rather prominent condylus medialis and well-marked tuberculum adductorium; facies patellaris is small. The lateral condyle is not so prominent. In the sagittal direc-

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transverse diameter, a characteristic of a kyphotic pelvis, which just shows an increase of diameter transversa and diameter recta, while the contraction in the inferior aperture could not be immediately recognised, especially as ossa pubis were injured and no reconstruction was attempted. Probability then points to a medium degree of funnel-shaped contraction of the inferior aperture, which must have made childbirth very difficult and at any rate exhausted the highly tuberculous young queen so much that she died in childbed. Perhaps the child, too, was atrophic, small, and badly developed for it is stated that, at the foot end of her grave, was found a small lead coffin containing ab. a half year old "scrofulous" child's skeleton. Thus the child could perhaps be born because it was badly developed, but died shortly after if the determination of the age is correct.

The dimensions of the long bones of the skeleton are also given, but are of no interest in this connection.

tion the condyles are relatively less prominent posteriorly, the medial one has the largest articular surface. There are strongly marked traces from musculi gastrocnemii. The traces on femur from the adductor muscles are well-marked. There are no symptoms of rhachitis. The articular surfaces of the knee-joint show no symptoms of affections in this joint, nor were there symptoms of disease in the hip-joint. In the case of the latter the extension of fovea capitis posteriorly and a little downwards shows itself as an impression of ligamentum teres.

Collum femoris being short upwardly and low, the angle between the axis of collum and the axis of corpus is abt. 121°.

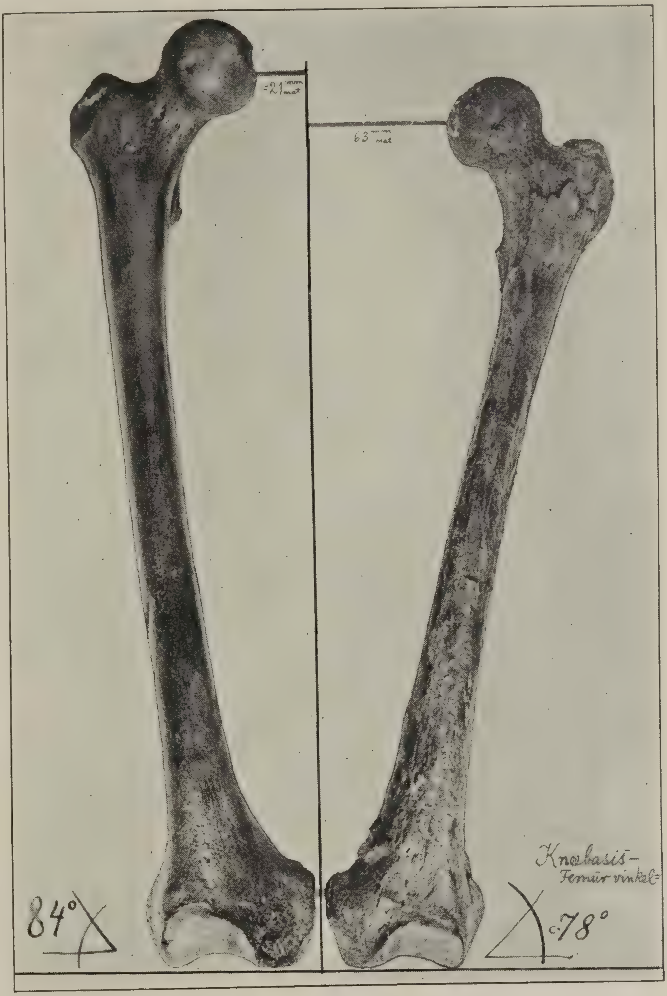

Fig. V.

Femur dext. Herjolfsnes I. 1:3,5 nat. Femur sin. Herjolfsnes II. 1:3,5 nat.

The angle which the plane through the inferior surfaces of condyli femoris forms with the longitudinal axis of femur is the so-called knee-basis-femur angle, which is abt. 84°. If now we assume that the angle between the kneebasis plane and tibia's longitudinal axis was rather near 90° or only little less or more, this indicates that the knees were kept rather far apart during the walk (cp. the figures of femur Herjolfsnes (Ikigait) I and femur Herjolfsnes (Ikigait) II) when we take into account the measured distance of 13.5 cm. between the bottom of the acetabula on the left and right sides of the pelvis and the rather obtuse angle between the axes of the short collum femoris and the axis of corpus femoris.

On comparing the well-preserved femora from Herjolfsnes (Ikigait) I and Herjolfsnes (Ikigait) II **(text-fig. V)** it will be seen that, in relation to the vertical line, when the femora are placed with the kneebasis horizontally, the medial tangent, to the articular surface of caput lies much nearer (in all 21 mm.) to the vertical plane, just past condylus medialis femoris in Herjolfsnes (Ikigait) I, while in the perceptibly shorter femur sin. from Herjolfsnes (Ikigait) II, where the kneebasis-femur angle is abt. 78°, and the angle of collum with the axis of corpus is 133° (cp. the short, low collum), the distance from caput to the vertical plane is exactly three times as large (63 mm.) as in Herjolfsnes (Ikigait) I measured in natural size. As we shall subsequently see when studying Herjolfsnes (Ikigait) II, the latter was thus much more "physiologically knock-kneed", had a much more pronounced physiological genu valgum.

Table 5. The dimensions of
femur dext. in Herjolfsnes (Ikigait) I are as follows:

The total length in the natural position from the surface of the condyli to the upper surface of caput is 416 mm.

The trochanter length from the apex of trochanter major to the kneebasis, articular surface of the condyli in the natural position is 398 mm.

Hence the difference is 18 mm.

Collum-diaphysis angle abt. 121° (as stated).

Kneebasis-femur angle abt. 84° (as stated).

From the length of the femur **the stature** or height of the body may be calculated with a certain amount of probability. This calculation and several considerations connected herewith will be dealt with in a special section (Chapter VII) in which all cases are treated and the stature investigated. Here we shall only mention the result arrived at in Herjolfsnes (Ikigait) I on calculating the height which the individual would have had if she had not been kyphoscoliotic.

The most probable height without kyphosis is:

in the recumbent position: abt. 152.5 cm.

in the erect position: abt. 150.5 cm. perhaps a little less.

The kypho-scoliosis must, however, have involved a considerable reduction in the length of the vertebral column, for which reason the stature must at any rate be somewhat, perhaps considerably, less, so that we must presumably reckon it to have been abt. 145 cm., perhaps somewhat less. We have then taken into account that the individual must be assumed to have been relatively powerfully built in the inferior extremities, while, as mentioned above, the size of the preserved part of the radius (of the superior extremities) indicated a feebler development of the superior extremities, which agrees well with what was found in several other skeletons from Herjolfsnes (Ikigait).

In this place we shall further give an account of the above-mentioned remarkable find on os pubis and on the back of the sacral region (and os coccygis) of pieces of **sealskin** to which were fastened remnants of twisted woollen cords. First we must explain that this skeleton Ikigait I, according to Dr. Nörlund's information was covered with a sealskin, with which it agrees that in various places seal hairs were found adhering to small pieces of bones of an indefinable kind.

On one of the ossa pubis near the symphysis was found a piece of sealskin with thick hairs (microscopically found to be seal-hairs) outwardly. Between this layer and an underlying layer of finer hairs (microscopically human pubes hairs) going in another direction and crossing the direction of the sealhairs, there were not found layers of woven cloth, as one would have expected from numerous other finds on the skeletons from Herjolfsnes (Ikigait), if there had been a woollen dress underneath the sealskin, (which would, however, have been the reverse of the probably general practice, for judging by the dresses and not least by their dimensions compared with the rather small individuals, skins were presumably worn under the neat dresses, gowns and hoods). Instead there was found a couple of rather thick twisted strands of redbrown stained wool (microscopically sheep's wool), looking most like remnants of a thin cord or string and very frail. Under the layer of human pubes hairs there was found a layer of the original human corium in which by microscopy the structure of the interlaced bundles of connective tissue could be plainly recognised with the roots of the pubes hairs still grouped in corium.

A great deal of these pubes hairs, on the part projecting outside the skin, still contained masses of keratinised detached epidermis cells surrounding the hairs like a sheath glued together with a fat-like substance, presumably remnants of the sebum cutaneum, partly soluble in ether-alcohol, indicating little or no washing of the skin, at which we cannot wonder. The hairs themselves differ somewhat in thickness; they were very frail, which was also the case with the more superficially placed and somewhat thicker seal hairs, partly and in spots attacked by humous substances and bacteria, having sometimes small eroded depressions and holes, sometimes well-preserved, sometimes almost quite dissolved. In other adjacent parts of the hairs the cortical substance is split up, the oblong, keratinised hair-cells being only loosened or quite isolated in the prettiest way as in a microscopical preparation (when the hairs are boiled in sulphuric acid).

The hairs partly contain pigmented granules, but some of this, not all, may be due to the putrefaction and the earth, as a rule the natural pigmentation is, however, recognisable by its appearance and place in the hair-substance.

The hair cuticula is in many places easily visible, in other places the cuticular cells are partly loosened or falling off the cortical surface. The medulla is preserved in some places, dissolved in others, leaving an empty tubular space inside the corticalis of the hair. Some of the pubes hairs have had a medullary substance, others not; the circumference and thickness of the hairs vary, but they are as a rule much finer and quite different from the seal hairs. A comparison shows complete correspondence with recent human pubes hairs.

Underneath the layer of human corium was found a lump of fat-like substance (fatty acids), remains of the more abundant subcutaneous layer of fat on mons pubis.

On a small perfectly well-preserved bone (by os sacrum), which could be clearly recognised as the **2nd vertebra coccygea,** fitting against the also quite uninjured and well-preserved **1st vertebra coccygea** subsequently found, (see the photos Tabula XI fig. 32—34) was found adhering to the posterior surface a piece of sealskin (microscopy!) with the hairs on; in this little piece of sealskin were the remains of a little twisted redbrown woollen cord or string (microscopy!) with the remains of a strongly twisted knot, fig. 32 and 34. As on os pubis this cord was very frail and crumbled easily. In addition to this a few other hairs were found on the 2nd vertebra coccygea, which proved upon microscopical examination to be human perineal hairs. When this little piece of sealskin with remnants of a small twisted woollen cord with a knot, has remained quite firmly attached to so small a bone as the 2nd vertebra coccygea, which like the 1st vertebra coccygea was perfectly well-preserved and uninjured, the reason must be as follows:—

When the body was laid in the grave there must have been lying on the back of os coccygis — i. e. in the sacral region between clunes — a strip of sealskin to which was fastened a redbrown woollen cord to keep the sealskin in place, while in front on mons pubis it was also kept in place by a couple of woollen cords which probably passed up to a cord or belt about the hip-region, thus representing a kind of bandage passing from mons pubis between femora down before pudenda and anus and up between nates in the sacral region.

As the body was laid on its back in the grave the point of the sealskin with the woollen cord was wedged into sulcus inter nates and secured in its position to os coccygis where, as is shown by the state of these bones as well as of os sacrum, which is well-preserved, the putrefaction and destruction was least, and when the cold subsequently increased, so that the earth became permanently frozen, just these small bones were preserved with cohering remains of hair, sealskin, and woollen cords. We must assume that even more remained at the exhumation than we now possess, but that most of it decayed or crumbled away before it reached the Museum of Normal Anatomy. Finally fibres of a plant substance (resembling hemp microscopically) were found close by, and in the layer beneath the sealskin on the symphysis were found, besides the human pubes hairs, loose hairs of sheep's wool of a light colour or only slightly pigmented, and lastly, small leaves of moss, this latter perhaps an accidental admixture(?).

Already above when we entered upon the possible pathologic conditions of the pelvis and kyphosis, we mentioned that this bandage, perhaps with loose wool, [moss?] and hemp linen underneath, may have been a kind of protective bandage for the absorption of secretions due to a morbid condition.

The investigation of the sealskin pieces, the human skin and the hairs was carried out as follows. Small portions were picked loose in layers, and it was at once determined how much could be observed with the naked eye or with a simple magnifying lens (loup). Simultaneously the components of the various layers were examined under the microscope, both in unbroken thin flakes and in picked preparations in water and diluted glycerine. It was impossible to diagnose the position of the components in any other way. In addition microscopic section preparations were made, partly unstained in glycerine and water, while various stains were tried, too. The tingibility of the tissues was, however, unfavourable and much altered, the best results were as a rule derived from unstained preparations which, when they were examined in distilled water, in glycerine or diluted glycerine, gave instructive pictures. The strong brownish staining of the tissues, due chiefly to the humous substances, had partly the effect of artificial staining. It must be noted that the collagene connective tissue, where it lay somewhat loose, had partly preserved its elective tingibility in respect to the most certain elective stain, the acid fuchsin-picric-acid stain in Fr. C. C. Hansen's[1] collagen staining, the connective tissue staining a deep red, while eosin could not stain the tissue which was evidently strongly tanned by the humous acids and was also rather refractory to the ordinary carmine and hæmatoxylin stains. On the other hand it stained deeply with basic dyes such as toluidin blue and diamond fuchsin in thin watery solutions, the tissues evidently possessing an acid component (humous acid compounds) causing strong affinity to basic anilin dyes. With Weigert's elastin staining the tissues did not stain.

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[1] Fr. C. C. Hansen, Eine zuverlässige Bindegewebsfärbung 1898, Anatomischer Anzeiger, vol. XV and in much greater detail in Fr. C. C. Hansen, "Der Hyalinknorpel". Anatomische Hefte, Heft 83, 1905.

Iron-trioxyhæmatein (Hansen)[1] however, as usual gave good results even in this difficult material, best when the solution was rather fresh.

As mentioned before a rather large lump of white substance was found adhering to the front of os sacrum on the left side. On chemical examination it was found to consist for the most part of fatty acids. In addition smaller lumps of fatty acid mass were found dispersed among small fragments of bones, and especially in the remains of earth and other remains in the pelvis.

After peeling off the external earthy parts a quite whitish or faintly yellowish mass of the largest fatty acid lump seemingly containing more consistent, here and there brownish, components, was taken out for the investigation of the tissue. The weight of this piece was about 22 gr. It was divided into four pieces which were laid in ether for 24 hours, after which the greater part of the substance dissolved. After evaporation of the ether this solution contained 18.5 gr. of solid components, for the most part fatty acids, i. e. abt. 84 p. c. Four pieces of very loose tissue remained. Though this must be considered sufficiently fixed partly by the humous acids, partly by the ether, it was as a further precaution laid for 24 hours first in ether-alcohol absolutus, then in alcohol abs. and was thereupon for embedding in paraffine transferred through xylol, xylol-paraffine and finally saturated with melted paraffine. Microtome sections of abt. 0.03—0.05 mm.'s thickness were made. The sections were then examined partly in water, partly in dilute glycerine and a series of stainings were tried. Cp. Tabula **LXXXV**, fig. 256—258.

The results were as follows:

Within the tissue lay remains of muscles and partly bundles, partly membranes of collagene connective tissue. Part of this was very distinct intramuscular connective tissue, for in its meshes transverse sections or oblique sections of muscle-fibres (striated muscular tissue) were seen in several places. The connective tissue bundles were as a rule very fine but also arranged in somewhat larger masses round spaces that probably answered to blood vessels (arteries and veins) — i. e. perivascular connective tissue. In other places the connective tissue fibres were found collected into thin membranes. It was remarkable to see with what precision and election this tissue dating abt. 500 years back, still stained a deep red with acid fuchsin in HANSEN's acid fuchsin-picric-acid-stain, best in the concentration 1.5 p. m. acid fuchsin in concent. watery picric acid solution with a very slight addition, 1 : 8000 of acetic acid to the staining solution, and for the rest with observation of the precautionary measures advised by myself already in 1898 and at greater length in 1900 in the Danish edition and subsequently in the German edition of my book „Der Hyalinknorpel", Anatom. Hefte, Heft 83, 1905,[1]) in which also all hitherto known collagene (and elastin) stains are fully described. It is a well-known fact that the acid fuchsin-pricric-acid staining method employed under the conditions first pointed out by me in 1898 is still the best and most specific collagene staining method. It is all the more interesting, then, that even in this material, which has been buried in a grave in Greenland for abt. 500 years, the collagene tissue shows in the main the ordinary tingibility for acid fuchsin-picric acid almost without alteration!

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[1] Fr. C. C. Hansen, Zeitschrift für wiss. Mikroskopie, vol. 22, 1905, p. 55.

As a curiosity I shall only add that as early as 1898 I examined the preservation, the histological structure and tingibility of cartilaginous tissue, bone tissue, and connective tissue in some material from an **Egyptian mummy** which had been presented for the skeleton to the Univerty Museum of Normal Anatomy. This mummy was embalmed with asphalt or resin-like substances which could be extracted with xylol etc. Here, too, the tissues proved comparatively well-preserved, thus the fundamental substance of the cartilage and the cells of the cartilage with stratified capsules, the whole structure of the costal cartilage, the fibril bundles of the perichondrium etc. were well-preserved and easily observable. After extraction with xylol, ether, and alcohol I could show that the collagene fibrils of the connective tissue had preserved their tingibility in regard to staining with acid fuchsin-picric-acid solution. Thus the tingibility of collagene with acid fuchsin-picric-acid seems to be dependent, as I have emphasised loc. cit., on a characteristic peculiarity of the collagene molecule or in the fibrils in the collagene molecule groups. As yet, however, it is quite unknown what is the peculiarity in the collagene molecules giving rise to the election in regard to the acid fuchsin-pricric-acid staining solution (cp. BUJARD loc. cit. 1923).

Eosin, even with the constant addition of acetic acid 1:10 000 to a watery 1 p. m. eosin solution advised by me,[1]) and with prolonged application, could not stain the tissues in this material from Herjolfsnes (Ikigait) I.

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[1]) Cp. EUG. BUJARD et E. CHERBULIEZ, Le mécanisme de la coloration de VAN GIESON, Comptes rendus de l'Association des Anatomistes XVIII Réunion Lyon 1923.

On the other hand, as mentioned above, the collagene stained deeply and the other components of the tissue more feebly but serviceably with toluidin-blue in watery solution 1 p. m., with diamond-fuchsin 1 p. m. or still weaker, also with thin watery solutions of cresyl-violet or methyl-violet.

The collagene was apparently the substance which stained best. Here and there traces of connective tissue nuclei were recognisable on staining with the above-mentioned basic anilins and with iron-trioxyhæmatein (Hansen), but they were not nearly as well preserved as the collagene itself, which hardly seemed to have been injured in any way.

Elastin, in the shape of elastic fibres and network could not be recognised with certainty. Weigert's elastin staining, which is the best method, gave no positive result either, in this mass of tissue from the lump of fat in the pelvis. Possibly we shall later on be able to see what has happened to the elastin, but beforehand we know that the elastic fibres on the whole are more easily attacked by the putrefaction processes than the collagene, or at any rate by certain forms of putrefaction, and in the cemetery at Herjolfsnes (Ikigait) in those cases at any rate where the bodies were buried without coffins and thus placed in direct contact with the earth, putrefaction no doubt occurred at a rather low temperature and in another way than in the coffins,[2]) and the effect of the humous acids and the humous substances seems also in several respects to have given the processes of dissolution a more elective character in the different localities.

Finally we shall proceed to a more detailed mention of the striated muscular tissue. The examination of this tissue called for a special measure of precaution, the muscular tissue being most easily recognised when the paraffine sections, after being freed from paraffine with xylol, were transferred very cautiously through alcohol of lower and lower concentration to water, and were either examined therein, or, as I have done with advantage both with this material and in former investigations, were examined in abt. 50 p. c. alcohol, or subsequently in thin glycerine (1 : 2 water). The effect on the tissues of the water I examined by direct observation under the microscope, adding slight amounts of distilled water under the cover glass and observing the effect. In the muscle tissue the water caused a partial swelling. The structures, which were visible on examination in 50 p. c. or 33 p. c. alcohol, became less distinct or disappeared entirely on the addition of water. Glycerine has a more protective affect, but clarifies the tissues; 1 p. c., 2 p. c.—5 p. c. chloride of sodium solution in water was often employed with advantage by me for the examination of such preparations instead of aqua destillata.

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[1]) Fr. C. C. Hansen, Om Efterfixering af Formolpræparater. Hospitalstidende No. 21. Copenhagen 1907 and later.

[2]) From the coffins in the cemetery at Ikigait not a single bone was preserved for examination.

Thus, a couple of years ago, portions of a body found in a[1]) bog (Dan. **"Moselig"** Germ. Moorleiche), were sent to me for examination at the Museum of Normal Anatomy from the 2nd department of the National Museum. They were in a quite damp condition.

I then gained some further experience with regard to the appearance, conservation and histological reactions of connective and muscular and other tissues in reference to reagents when acting on such fresh bog-finds, and shall in this connection give briefly a few main features. In the loose connective tissue, the tendons, fasciæ, membranes, periost, bone and other, the collagene was well preserved, as it were tanned; the elastin could not be recognised with certainty. The vessels were preserved in part, and remains of the smooth unstriated muscular tissue were, though much changed, distinctly visible within the connective tissue sheaths of adventitia. Nerve trunks, too, could be recognised by their connective tissue components and sheaths.

Of the striated skeletal muscles large portions remained which, on examination in diluted alcohol, still showed the cross striation(!) of the muscular fibres; but upon the addition of water under the coverglass the striation soon disappeared and only the longitudinal fibrillation remained! The sarcolemma was still distinct in many places. As it is well known, the osseous tissue is as a rule quite decalcified in that kind of bodies found in bogs, but its form and structure were well preserved, only the colour was as usual quite black or a dark brownish black from the components of the bog-water. Some of these facts are known from former investigations. The body in question was undoubtedly very old, amongst other things there were shoes on the feet of a very ancient appearance, made of pieces of cowhide on which the hairs still remained.

I mention the examination of the striated muscles in this case, amongst other things because it shows how such a fairly fine histological structure as the striation of the skeletal muscles may be preserved for a very long time, perhaps for many centuries, in the depth of muscle masses, in bog-water of a certain suitable (not always occurring) composition, but is destroyed more easily than many other tissues especially by pure water.

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[1]) Regarding the macroscopical state of preservation of the human bodies found in bogs or moors, cp. a. o.: Ad. Pansch: II Anthropologisches, in Moorleichenfunde in Schleswig-Holstein 1873.

In the muscular tissue in the pelvis from Herjolfsnes (Ikigait) I I could not show the cross striation of the muscle fibres, but the polygonal transverse section of the muscle fibres was very characteristically preserved. In oblique sections and longitudinal sections the myofibrils were visible as a fine longitudinal fibrillation and in the transverse sections as fine points. The addition of water somewhat obscured the contrasts, but did not quite destroy the fibrils though in spots they became less easily observable. Probably the destructive histolytic processes have acted differently in the depth of the muscle masses and in their external portions. I consider it highly probable that the fatty mass had a protective effect and, if immediately upon the excavation from the frozen earth histological conservation of parts of the body tissue had been carried out, e. g. in formalin alcohol or common alcohol or in formalin water 4 p. c., a much finer histological conservation of the tissues for examination could have been obtained than was now the case with this material, which had lain packed up so long after the excavation and had subsequently been washed out. It merits mention that staining of the muscles with iron-trioxyhæmatein (Hansen) and with toluidin blue and diamond fuchsin also coloured the muscle fibres if only faintly, yet recognisably and serviceably. Here and there were also shown meshes calling to mind empty fat cell membranes, partly surrounding connective tissue sheaths resembling vascular sheaths round smaller vessels see Tabula LXXXV fig. 256, 257, 258.

Finally the microscopical examination of the osseous tissue in the bones is of some interest. It is a well-known fact that, next to the dental tissues, this is of all tissues the one that best preserves its structure, and so it proved in this case, too, and in several other cases of the finds. The bone cells, i. e. the spaces in which the cells had been situated were as a rule very distinctly visible — and in them were seen finely granulated masses as the remains of the bone cells. From the inner side of the left os ilium below linea terminalis was removed a piece of quite thin loose membrane which was at first supposed to be a piece of the periosteum. It stained with acid fuchsin-picric-acid and was dehydrated with alcohol abs., and after clearing in xylol mounted in xylol-Dammar. The preparation at first showed only a very indistinct structure, some portions of bone structure could be distinguished, otherwise it was opaque owing to its thickness. When the preparation had been lying mounted for about eighteen months, however, like some other rather thick and opaque preparations in balsam (Dammar), it seemed somewhat clearer and was then subjected to a repeated investigation. During this period a further differentiation had then taken place in this very preparation, evidently analogous to the changes I have mentioned in my work "Der Hyalinknorpel" 1905, when the picric acid which is soluble in a very small amount in xylol and canada-balsam or Dammar is allowed to exert an "after-effect". This after-effect is sometimes differentiating as in the present case, sometimes, however, as known, a not always desirable altering of the coloration of the stained tissues of the preparation, but occurs the more easily the thicker a section is, the greater the amount of picric acid contained in the tissue, and, the more xylol balsam there is under the coverglass, and the less carefully water and alcohol were removed when mounting, as is often the case in many pathological diagnosis preparations. In the case of this preparation partly the tissue had become perceptibly clarified and more transparent, partly a considerably more favourable differentiation of the colours had taken place, whereupon it was seen with perfect distinctness that the material in question was not periosteum but the thin osseous lamellæ just beneath periosteum. Distinctly visible were the vascular canals (surrounded by their "Haversian lamellæ") running in different directions, but seen mostly from the surface or longitudinally, further larger or smaller cavities were observed, plainly enough, absorption spaces or errosion spaces in the osseous tissue with numerous Howshipian lacunæ in the walls of the space. Also such eroded absorption spaces were met with in which a vivid deposition of fresh osseous lamellated tissue (not decalcified osteoid tissue!) had been begun. In some places this new formed osseous tissue was as yet only seen filling up peripherically the former Howshipian lacunæ, in other places the deposition of fresh osseous substance was more advanced.

And while the somewhat older, earlier calcified osseous lamellæ were more yellowish or yellowish-reddish, the quite recent and subsequently deposited thin shells of osseous tissue stained a very distinct red with acid fuchsin in contrast to the older osseous substance. In the recently formed osseous tissue were seen enclosed osteoblasts, partly in their young form with not so numerous, but thicker, and not so richly-branched and anastomosing processes, while a little more peripherically, in the slightly older newformed bone lamellæ the cells were seen as fully developed characteristic bone cells. There was also a distinct difference in the intensity of the red colour between the quite recently deposited and the somewhat previously deposited osseous tissue.

Remains of the soft tissue (connective tissue) in the Haversian canals could also be seen. In short, this bone surface showed such a vigorous absorption process and formation of new osseous tissue as should not have been expected in an individual of the age in question, at which it might be supposed that the size and shape of the bones would be fairly stationary. Whether this phenomenon was perhaps connected with pathological processes outside the bone, in the vicinity, or with the well-known highly developed reacting power of the bone tissue to changes in the static or mechanical relations, are possibilities that cannot be absolutely excluded. Special investigations in this field are at present not known to me, but we have the well-known analogies from the adaptation of the bone structure to deformities (fractures) and other abnormal conditions as chronic pressure on the bone.

As in this case of Herjolfsnes (Ikigait) I there were here and there found partly small separate pieces of skin with hair and partly free hairs adhering either to the remains of the skeleton or other remains of the body or to particles of earth, numerous microscopic examinations of the **hairs** and skin fragments were made. The results will be stated in the succeeding lines as they furnish several particulars of interest.

For comparison with the hairs from find I and other finds a series of preparations of human hairs from various parts of the body were procured, and also a series of samples of hairs from various mammals, and among these especially hairs of the terrestrial and marine mammals occurring in South Greenland[1]) of which it would be most likely that remains would occur, viz. of the ox, sheep, goat, dog, cat, polar bear, arctic fox (white and blue), mountain hare (Lepus timidus), reindeer, walrus, ringed seal (Phoca foetida), Greenland seal (Ph. Gr.), Cystophora cristata (and a few others which do not come into consideration).

From numerous pieces that were examined only four sorts of hairs were made out, viz. of man, of sheep, of seals, and of cattle.

Of human hairs pubes hairs were made out from the layer on os pubis under the sealskin (as mentioned above, the human hairs were here partly mixed with light or slightly pigmented sheep's wool-hairs which had evidently been laid under the sealskin). The pubes hairs were generally unpigmented or only very slightly pigmented (granulated light brown pigment in the corticalis substance). They were sometimes quite well preserved with or without medulla and with cuticula well preserved, sometimes more or less, and often in spots, attacked by destructive processes — attacked by fungi or bacteria — or the influence of humous acids. A striking feature here as well as in the animal hairs was the often very fine "histological" isolation of the keratinised cells of corticalis and cuticula. A few hairs had preserved the bulbshaped root and some root sheaths were also found.

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[1]) The material for these hair tests was kindly furnished by Professor of Zoology ADOLF JENSEN, Copenhagen.

Further, perineal hairs were found, best from the 2nd coccygeal vertebra. In general they were very well preserved with an elegant cuticula and corticalis, most often with rather a narrow medulla, the cells of which looked quite well preserved, and where the place of the nucleus could still be seen. The perineal hairs contained hardly any pigment. In addition to fragments of these hairs others were found with well-preserved apex. The transverse sections of the pubes- and perineal hairs were ovals or oblong ovals.

From other fragments from find **I** human hairs were made out derived from other localities of the skin, probably from the scalp. They had a narrow medulla, a well developed cuticle and in part light brownish pigment granules in corticalis. It is probable that the pigment granules found in the hair substance are those originally present, and are not due to the changes consequent upon the decomposition of the body in the grave. The appearance and position of the pigment was quite natural and could not be confused with that of the dark or black pigment granules found in or on hairs showing signs of decay. There is thus some probability that **the hair on the scalp of the individual was light brownish,** while the pubes and perineal hairs corresponding herewith are as a rule fairer and less pigmented.

Hairs of the sheep (ovis aries) were found partly loose (unspun), partly in fragments of cloth in the shape of twisted threads, partly in somewhat thicker cords. The hairs were in these cases dyed red-brown, often very darkly. Cuticula was as a rule very well preserved. These hairs were as a rule devoid of medulla, and varied greatly in thickness, the larger ones might in spots show a small amount of medullary cells, the smaller ones were without medulla. Part of the sheep's wool contained pigment granules, other parts were unpigmented (apart from artificial diffuse colour) and the latter were by far the most numerous. Light or feebly pigmented wool hairs were thus most frequently found also among the artificially dyed hairs. More intensily pigmented wool hair with a granulated pigment of natural appearance and arrangement was more rarely found.

In addition to the largely predominant genuine wool hairs also the large hairs were sometimes found (German term: Grannenhaare) with some medulla in spots and with a peculiar large cuticula-cell mosaic very much resembling the large hairs (German Grannenhaare) of the wool of Leicester sheep. The sheep were perhaps mostly light, less frequently dark.

Hairs originating from the goat or the ox were found in small quantity dispersed in several places. A very small piece of skin had such hairs exclusively. The medulla was large, the cells distinctly marked off, but the cells themselves were empty. A few hairs still retained the root. In these hairs cuticula was as a rule badly preserved or entirely lacking; the hairs themselves gave one the impression of being much worn, they were nearly all broken off a little way from the surface of the skin, and the surface of the fracture was worn to pieces, frayed and very darkly discoloured on the surface itself and a small adjacent piece of the hair. Evidently it must be hair from old, much worn and much used skins. Many of these hairs proved brittle, much attacked by fungi, sometimes from the surface in spots, sometimes from fungi growing into the medullary substance.

This destructive process is quite as in some sealskin hairs. As the state of preservation was deficient, it is impossible to determine whether they were from goats or cows. Most probably, however, they are goat hairs. These goat or cow hairs were also found singly mixed among the loose sheep's wool.

There were numerous seal hairs, partly loose, partly attached to fragments of skin. The species of the seal could not be determined. There were both smaller and larger hairs, but predominant were the large, thick, firm hairs with a well preserved cuticula, a thick, compact corticalis substance; sometimes the substance was somewhat less compact in the middle, as a rule there was hardly any meddulla, though a few hairs showed it in spots. Well preserved hairs and apices were commonly found, but also small skin fragments on which the apices of the hairs were rubbed off, the hairs broken and split, and the substance of the hair darkly discoloured on the surface of the fracture and a small adjacent piece. Such old seal hairs are sometimes much attacked by fungi or bacteria, this was especially the case with the hairs of the small piece of sealskin (presumably long used) found adhering to the 2nd vertebra coccygea. (Note the contrast with the well preserved human perineal hairs from the same coccygeal bone!). On some of the hairs from an isolated piece of skin (besides that from os pubis) the root-ends were well preserved and in part also the remains of the epithelium of the root sheaths. On the microscopic examination of the cutis of the sealskin see further **chapter XI.**

In addition to the animal hairs well preserved threads occurred, and on other skeletons (X, XVII) remnants of cloth made of coarse-fibred plant substance. Those from the present case have already been mentioned. The examination showed bast fibres quite similar to hemp (not flax). Finally we note that particles of moss evidently from the same period were found lying here and there under fragments of skin, between these and the bones, but as a rule mixed with wool.

Herjolfsnes (Ikigait) 1921(-22). Skeleton II.

Woman abt. (25)—30 years. Height 138—140 cm. breadth of shoulders 31—32 cm. somewhat slenderly built. Scoliosis in a slighter degree. Flat rhachitic pelvis, somewhat asymmetrical, some genu valgum. Typical female dress. **Tabula XIII—XX. LVIII—LX. LXXI.**

The skeletal remains were somewhat damaged and partly — as in the case of femur — somewhat chipped on the surfaces. They were treated and conserved as mentioned in case I.

Of the vertebral column was found: corpora of the 4 lower fairly powerful lumbar vertebræ and os sacrum. The latter was very flat, of female type, the sacral segments had only quite recently become fused. No os coccygis present. The corpus of the 5th lumbar vertebra was found, it corresponded to os sacrum, forming a distinct promontorium. In the sagittal direction this corpus vertebræ was markedly cuneiform, lowest posteriorly, moreover the left side of it was appreciably lower than the right side, (but not nearly so much as in case I). Compare this with the below-mentioned pronounced difference between the right and left clavicula, of which the left especially was smaller in the sternal extremity than the right, with the deformity of the pelvis, and with the asymmetry of the skull. In the skeleton of this individual, too, there was a scoliosis, though in a somewhat slighter degree, of a rhachitic character (see illustration Tabula XIII), which is also well exhibited in the os sacrum and in the preserved part of the lumbar region of the vertebral column from which corpora of the 2nd—5th lumbar vertebræ are preserved (fig. 38—40). Note the torsion!

In this connection the shoulder girdle merits mention. Of the sternum was found manubrium and corpus, while processus xiphoideus was very naturally absent. The illustration Tabula XIV fig. 41 shows the sternum from before, while the two clavicula are laid in the same plane as the sternum, as they may most probably be supposed to be placed when the correct shoulder breadth is to be marked by the acromial extremities of the clavicles. The long, narrow shape of the sternum at once strikes the eye. The short, triangular manubrium sterni has rather flatly placed articular surfaces for clavicula, corresponding to the mutual size of these there is a smaller incisura clavicularis sin. than the corresponding dexter. The incisura surprasternalis is hardly marked. The lateral surfaces for the attachment of the costal cartilages show that these latter were small. Further there is an appreciable, marked asymmetry between the right and left sides both of manubrium and corpus sterni, the right side being here again somewhat broader than the left side. It is noted that the sternal extremity of the right clavicle is much stouter and more powerful than that of the left clavicle, while there is also an appreciable difference in the thickness of corpus claviculæ and of the acromial extremities between the right and left sides. If we reckon with an addition to the acromial end of the clavicle in the given position answering to the probable breadth of processus acromion in this place — viz. abt. 2 cm. on each side, we shall have a fairly probable measure of the shoulder-breadth of the individual in the skeleton. The distance between the two acromial ends of the clavicles is abt. 13.5 + 14 cm. = 27—28 cm.; adding to this 2 × 2 cm. = 4 cm. for acromion, we get a skeletal interacromial shoulder-breadth of 31—32 cm. This, with a slight addition for the skin and the subcutaneous tissue, answers to the extreme end of the shoulder skeleton (acromion) easily palpable through the skin. It is true that the shoulder muscle, m. deltoideus, is lifted a little forward and outward by the (here rather small) caput humeri, and curves out a little more laterally, but the size found will nevertheless give a good idea of the shoulder-breadth of the individual which is by no means very impressive. The greater development of the right side of sternum and especially of clavicula dext. compared with clavicula sin. is somewhat more than should be expected from the habitual greater use of the right arm in contrast to the left, and may possibly be associated with the scoliosis hinted by the form of the lumbar region of the vertebral column. Cp. also text-figure I p. 307.

Both humeri are present (Tabula XV fig. 42, 43). They are rather slender especially at the elbow. The right humerus is appreciably stouter than the left which, however, is best preserved. Of the shoulder muscles, especially m. deltoideus, are found well marked traces.

Otherwise only a small os hamatum of the left carpus was found.

Table 6. Dimensions of humerus dext. and sin. Case II.

Length of humerus dext. 275 mm.
— - — sin. 273 mm.

Of the skeleton of the pelvis, in addition to the above-mentioned os sacrum, both ossa coxæ were preserved to a considerable extent, especially in the main the portions corresponding to os ilium and os ischium, even though there were some injuries here and there. Os pubis, on the other hand, was practically absent on both sides. On os coxæ are still visible epiphyses which have only a short time before become fused with the main part, and are now partly loosened again or may easily be detached. The bones are on the whole rather small, and the pelvis is of the female type, most easily recognisable in pelvis major. (At a later period, when such interesting results had come to light upon the reconstruction of the pelvis from Herjolfsnes (Ikigait) I, a reconstruction, considerably easier, of the pelvis from Herjolfsnes

(Ikigait) II was made, which showed that it was a pronounced specimen of a flat rhachitic pelvis, about which more below).

Of the skeleton of the free inferior extremities only a (sound) caput femoris with some of collum from the right femur was found. The entire left femur was present. This bone is somewhat small and considerably shorter and more slender than the femur from Herjolfsnes (Ikigait) I. The bone is of the female type. Caput is well preserved and rather small, collum clumsy, short, and low, the angle between the axis of collum and the diaphysis is abt. 133° — compare the short upper border of collum. The surface of the diaphysis is somewhat disquamatory here and there, (Cp. also the illustration, text-fig. V pag. 329 (with femur I og II) and the femora from case I and from cases XV and XX). Se also Tabula I, XII, XVI, XLVIII, XLIX.

Trochanter major and minor are rather small. Corpus is somewhat convex medially, especially downwards (seen best in the picture on the posterior aspect (Tabula XVI fig. 45), and somewhat concave laterally. Extremitas inferior is somewhat more clumsy and not so large compared with the length of corpus as in the femur from Herjolfsnes (Ikigait) I. The medial condyle descends considerably further distally than the lateral(!) one, which points to a tibia-kneebasis angle of less than 90°, whereas the lateral condyle, in its lateral aspect, is somewhat longer in the sagittal direction (than the medial one). There is also a deep and well marked groove for the tendon of musculus poplitæus (fig. 47). Fossa patellaris is rather small, the patellæ being on the whole relatively small on the skeletons from these finds. (Tabula I fig. 1).

The condylar surfaces of the femur are placed rather obliquely in relation to the longitudinal axis of the bone, the kneebasis-femur angle being abt. 78°, i. e. considerably less than in case I — see the illustration text-fig.V pag. 329 in which femur from Herjolfsnes (Ikigait) I is placed side by side with femur from Herjolfsnes (Ikigait) II, so that it is plainly seen how caput in the latter has a distance from the sagittal-median plane which in natural size amounts to 63 mm., i. e. three times the distance (21 mm.) which Herjolfsnes (Ikigait) I has from the same plane. In the same illustration is also seen the pronounced difference between the kneebasis-femur angles in these two skeletons, and the striking resemblance between the two femora in the upper part.

For Herjolfsnes (Ikigait) II it follows from these facts that, as already mentioned under case I, the individual had a greater physiological genu valgum, associated with the greater shortness of femur. Probably a slight rhachitis had also some influence in this form (see case XX). All the circumstances tend to show that the pelvis

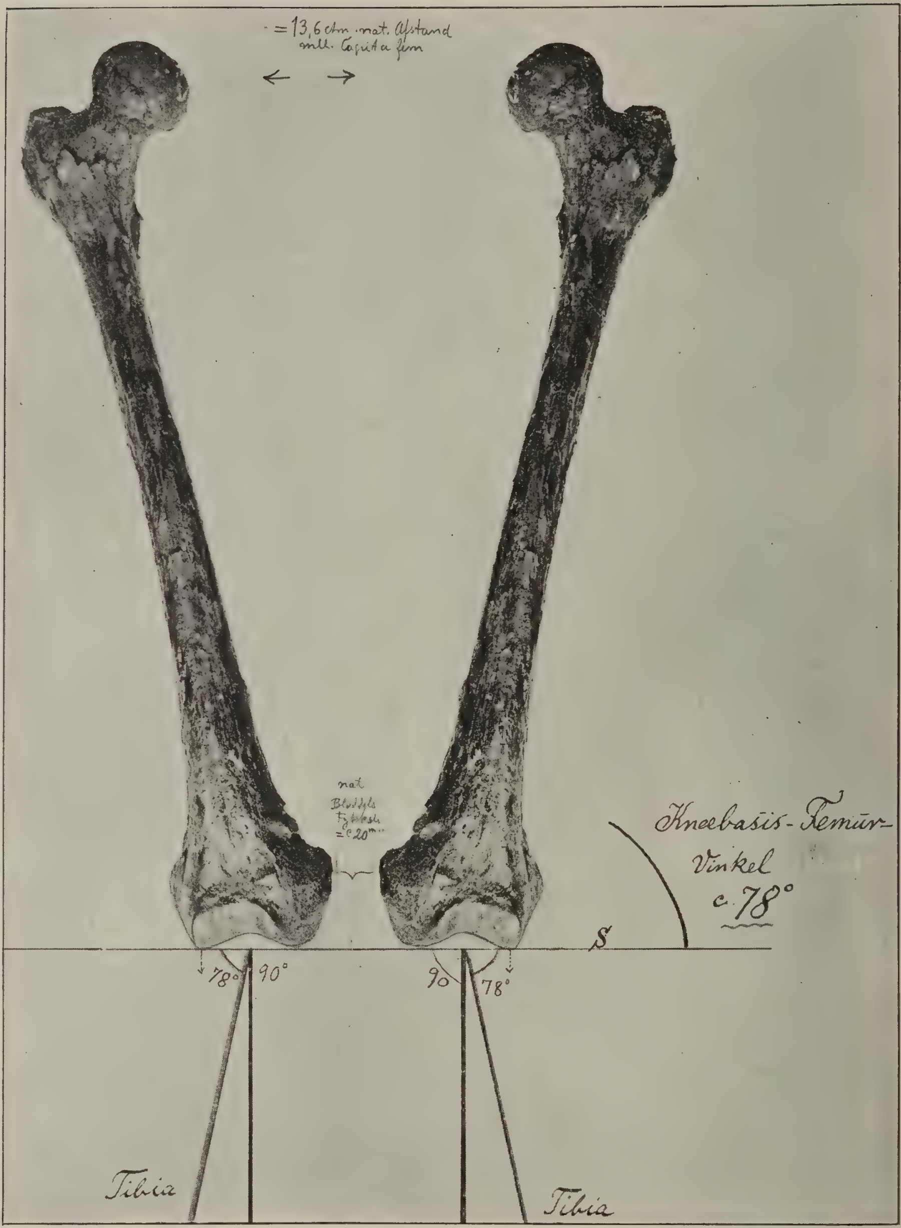

Fig. VI. Herjolfsnes II, anterior view. Explanation in the text.
1:3,3 nat.

was relatively broad for a female pelvis. Below we shall try to form an estimate of the probable width of the pelvis in another way, starting from the above-mentioned characteristic conditions in the preserved femur. There was a slight platymery.

Table 7. Measurement of the length of the femur sin. Case II.

Total length in natural position	390 mm.
Trochanter length	368 mm.
Difference	abt. 22 mm.

If on the basis of the material at hand we assume temporarily that, in spite of the shape of the pelvis, the right and left femur were of fairly equal length, conditions in the preserved left femur may be used to draw certain conclusions as to the corresponding breadth of the pelvis.

If the left femur is placed with the kneebasis plane horizontally as shown in text-fig. V exhibiting the two femora from cases I and II, the diaphysis of the femur from Herjolfsnes (Ikigait) II will, as said before, form an angle of 78° with the horizontal plane, hence the distance from the median plane of caput femoris to the sagittal plane which passes just by the condylus medialis of the bone will be abt. 63 mm. This quantity then answers with great approximation to a distance between the capita of the right and left femur of abt. 12.5 cm. If we consider **text-figure VI,** where the left femur from Herjolfsnes (Ikigait) II is exhibited symmetrically with its mirrored image, which will then represent a corresponding "right" femur, the following considerations may be advanced:

In the natural erect attitude, when the knees are kept together as much as possible, and the kneebasis is placed horizontally, there will of course in life have been some distance (see text-fig. VI) between condyli mediales femoris on the right and left sides, as the soft parts, skin and muscles will intervene. The minimum thickness of these soft parts we may here with a certain degree of probability fix at abt. 10—15 mm. on each side, or 20—30 mm. in all.

In figure VI a distance answering to a thickness in the soft parts of 20 mm. in all in the natural size has been reckoned with, hence the distance between the medial surfaces of the right and left caput femoris will be abt. 13.6—14 cm., since the cartilage on caput femoris and the articular surfaces of acetabulum on each side must be included. After subtraction of the bone and soft parts, this would answer to an internal distance in cavum pelvis between the surfaces of the bones opposite acetabulum dext. and sin. of abt. 12—12.5 cm., a small margin being reckoned for the position of femora, so that a small abduction outwardly in the hip-joints will increase the distance inferiorly between condyli mediales with some millimetres without appreciably influencing the main position of the femora, which we assumed to be that in which the knees were kept close together. The distance found between the acetabula and the corresponding breadth of the pelvic cavity corresponds in this respect exactly to these dimensions in a large, spacious female pelvis, and we may with a great degree of probability regard this information as approximately correct, and it was verified later by reconstruction of the pelvis.

It still remains to be considered what was the position of the legs, crura, respectively tibia, in relation to the femur (comp. text-fig.VI). The angle formed by the longitudinal axis of tibia with the horizontally placed kneebasis plane through the knee-joint varies a great deal physiologically. In fairly normal circumstances it may be reckoned that the longitudinal axis of tibia very commonly forms an angle of abt. 93—90° or a little less with the kneebasis-femur plane. This kneebasis-tibia angle may even without being pathologic be less, until abt. 78—80°. In the female, as in the present case of Herjolfsnes (Ikigait) II, the relatively broad pelvis, and the relatively short femora will always involve a pronounced so-called physiological genu valgum, even if the longitudinal axis of tibia forms an angle of abt. 93—90° with the femur condylar plane for the kneebasis. If the lateral angle between the longitudinal axis of tibia and the kneebasis diminish, the feet will stand farther apart when the knees are kept together, and the characteristic physiological genu valgum will be very conspicuous. If the knees, and hence condyli mediales femoris, are further removed from each other, the distance between the feet will also be increased. In short, with a broad pelvis, short femora, a small kneebasis-femur angle, and a small kneebasis-tibia angle the physiological genu valgum will become specially conspicuous and more strongly marked, particularly during the walk when the knees are to pass each other, for which reason the inferior extremities become abduced, as daily experience shows. Compared with her stature — calculated from femur (see below) — this woman's pelvis must have had a comparatively broad appearance (cp. the text-fig. XII pag. 361 below by the description of the flat pelvis), and the character of the gait (abduction of the knees) must no doubt have answered to the considerable physiological genu valgum. In order to obtain a graphic expression thereof, several diagrams were constructed, showing the variation in different positions of the femora and tibiæ, and the distance between the right and left inferior extremities, but it is not necessary to give them here since the preceding explanation gives all that is necessary to judge of the influence of these factors. We expressly emphasise that, in the case of Herjolfsnes (Ikigait) II, there can be no question of an actual pathologic genu valgum, but only of a variation in position, which may still be physiological and, for various reasons, is very conspicuous in this case; the line from the top of caput femoris to the middle of the talo-cural joint must at any rate have passed closely inside the external surface of condylus lateralis, or possibly a little outside the condyle.

The **height** of the body was calculated from femur to be abt. 138—140 cm.

Of the **skull** was found the whole of theca cranii, but the facial part and the anterior part of basis cranii were absent. The frontal bones and the upper orbital borders were, however, preserved, both ossa temporalia were also found, and the posterior part of arcus zygomaticus. The lower jaw was present but broken in the middle, it could, however, easily be assembled. The lower jaw may with a great degree of probability be placed in the correct relation to the skull, for by comparison with the upper jaw-bones and other skulls of the short-jawed type from the same find we may put the height of corpus maxillæ at 36 mm. (measured), and the height of processus frontalis maxillæ at abt. 20 mm., the dental height at 8 mm. (measured) in all abt. 64 mm., hence the position given in norma temporalis can hardly be very incorrect.

The skull was small, all the sutures were open — as regards the dimensions, measures, and indices see the tables below in Chapter V, The Crania. Cp. **Tabula LVIII—LX.**

Index cephalicus was 77.78. The skull is thus dolicocephalic. The capacity could be measured approximately by filling the skull with millet-seed and, making all possible allowance for the damaged condition of the skull and a consequent deficiency, it proved to be conspicuously small, viz. only abt. 1050 ccm. which is even most probably 20—30 ccm. too large! The strikingly small capacity will easily be understood upon a study of the illustrations in $^3/_5$ natural size. Cp. Figures 178—181.

The face must have been one of the well-known small, low faces. The forehead (frons) is narrow and low, the profile mostly female, somewhat receding. There are small tubera frontalia, and anteriorly upwards in the sagittal line the forehead tapers somewhat towards the vertex which in profile exhibits a flat arch descending somewhat steeply towards the occipital region in the posterior $^2/_5$. Protuberans occipitalis externa (Inion) lies high up towards lambda, and the planum occipitale is, as seen in norma occipitalis, very small(!), whereas planum nuchale with the attachment of the neck muscles is relatively large. Os frontis is relatively much reduced compared with the two ossa parietalia which are well developed and show a well marked tuber parietale.

Ossa temporalia are rather small with a small squama and a small processus zygomaticus. The ear-openings are conspicuously small and the anterior wall of the meatus acusticus is thin and partly defective. There are small processus mastoidei with a deep fossa digastrica. The surface where the musculus temporalis arises is not very large. The orbits must have been small, the lateral portion of the upper orbital border is sharp, the root of the nose not broad (interorbital breadth abt. 22—23 mm.).

Seen from above the skull proves markedly oviform in norma verticalis, broadest somewhat behind the centre, corresponding most nearly to tubera parietalia and tapering strongly both anteriorly and posteriorly by which the short and narrow shape of the frontal part appears very plainly. There is some asymmetry not due to post-mortem influences. This strong reduction of the dimensions in the frontal and occipital regions is very obvious, and if seen in norma occipitalis from behind, the cranium exhibits a marked pentagonal form with the low-lying vertex and much reduced planum occipitale in contrast to the large planum nuchale. This seems to indicate that the cerebellum which is so closely associated with the coordinated movements had retained a comparatively larger volumen, while the posterior portions of the cerebrum were situated to a greater extent under the parietal bones, and taking into consideration the strongly reduced frontal part and the small capacity of the skull, this seems to indicate a relatively considerable reduction of the cerebrum. If we compare this skull Herjolfsnes (Ikigait) II with the skull of Herjolfsnes (Ikigait) XVIII and a few others from the same find, the agreement in the great tapering and reduction of the frontal parts of the skull is plainly seen.

The lower jaw has the following dimensions:

Table 8. Mandibula, Case II.

Bi-condylar breadth, approximate	114 mm.
Bi-Angular — —	94 mm.
Mento-alveolar height (least)	27 mm.
Height of ramus dext. — - — sin.	68 mm.
Breadth of ramus	28 mm.
The mandibular angulus is	112°

The mandible is small, short, and tapers much anteriorly with a small prominent and pointed chin. The mandible is obliquely shaped and asymmetrical, the left half being appreciably smaller than the right. One incisor tooth in the left half must have been lost at an early age so that both the alveolus and the space for the tooth has quite disappeared.

The condyli are small, the left is the smaller one, a little chipped on the borders and laterally. Anguli are much rounded. Processus coronoidei were strikingly small besides their apices being somewhat broken off. Corpus mandibulæ is rather thick and massive.

The **teeth** see pictures in Tabula **LXXI,** fig. 205—208 are not very large, but well developed without caries, and as usual very much worn in proportion to the age of the individual. On the right side is found: the 2nd incisor, much worn, while the crown of the first incisor is broken off at the root. Next there are the empty alveoli for the dens caninus and for the 1st premolar. These teeth have fallen out after death, whereas the 2nd premolar was lost at an age when the growth of the jaw was in the main completed, and the alveolus is now filled up with osseous tissue. Finally the 1st and 2nd molars are found. Opposite the 1st and 2nd premolars and the 1st molar, and in part opposite the 2nd molar on the inside of the processus alveolaris of the mandible, is found a considerable periosteal osseous thickening, though otherwise no signs of pathologic conditions are found round the teeth or in the osseous tissue of the jaw. It must no doubt — as we shall see in a few of the other cases — be explained as a kind of functional strengthening of the bone in this place. There is plain evidence, too, that the wear on the right side of the dental row was greater than on the left.

In the left half of the mandible is only found the lateral (II) incisor, (the tooth itself has, however, fallen out of the alveolus after death) and dens caninus. The 1st premolar has been present but has fallen out of the alveolus; the 2nd premolar is present, also the 1st and 2nd molars. The wisdom-teeth (dentes serotinæ) are absent and have never been present, nor is there space in the jaw behind the 2nd molars for a 3rd molar. In complete accordance with what will be described in more detail in subsequent cases (especially X—XVII—XVIII—XX) the teeth exhibit very great wear. Especially the first molar, which comes as the first of the permanent teeth at the age of 6, was very much worn down for the comparatively early age (25—30 years) of the individual. There was also much wear of the front teeth, premolars, and canine teeth, which come comparatively early in childhood (7—11 year) and must thus take an essential part of the wear of mastication before the 2nd permanent molar breaks through (at the age of 13—14), but this tooth, too, shows considerable wear. In the other teeth the crowns have long been worn down; the cuspides are quite gone from the 1st molar, the right front tooth, and the left canine tooth, also the lateral cuspis of the 2nd left premolar has totally disappeared.

The dentine is here exposed everywhere and new secondary dentine is seen at the surface of wear filling up the pulp (tooth) cavity, which has nowhere been opened. In reality the tooth cavity is never opened or the soft pulpa exposed even with powerful mastication, where "legitimate" wear on sound teeth is concerned. Even when the food is very hard and wear is strong as no doubt it was for all individuals of this find, secondary dentine fills up the tooth cavity before the wear reaches this cavity. The wear in the 1st molar is very distinctly seen in the pictures in the lateral aspect of the right and left halves of the jaw. It is seen how the left I molar has been worn down to almost only half the height of the crown. In the right I molar the wear is less. The enamel was very brittle and came off very easily during the examination, so that part of the subjacent dentine of the crown is seen exposed in the pictures.

On the left side of the mandible there is a greater interval than usual between the 2nd premolar and root of the 1st molar, whereas the crowns are in direct contact with their approximal surfaces. This is probably due to the loss of the central incisor tooth at an early age; moreover the limbus of processus alveolaris seems to be somewhat lower (slightly atrophic) on the left than on the right half of the mandible, — answering perhaps to a somewhat reduced function of the left half of the lower jaw in the later years of youth, compared with the distinctly smaller development of the left condyle. In pictures of the mandible seen from above the greater and coarser shape of the right half of the jaw will easily be recognised. Cp. Tabula LXXI.

We may with certainty conclude, that also the left half of the upper jaw and the left half of the facial bones have been of correspondingly smaller dimensions.

Investigation of the Pelvis.

The examination of the finds from Herjolfsnes (Ikigait) had, as it proceeded, brought to light a long series of pathological conditions in the individuals — of great interest in the attempt to estimate the build, somatic complexion and state of health of the population in the old Norse colony abt. 500 years ago. Owing to the damaged and defective condition of the whole of the material the work was exceedingly troublesome and took much time, besides necessitating parallel studies in surgical, orthopædic and obstetric fields, on which the investigation naturally touched. In the interpretation and estimate of the findings in the skeletal remains very much and unexpected extra work had to be done of the purely medical character described above (case I). The greater part of this work of course resulted in various considerations and the exclusion of a series of possibilities which had to be weighed, the enumeration and more detailed description of which would, however, take up too much space, for which reason it has in the main been omitted.

After the interesting results gained from the reconstruction and thorough analysis of the pelvis in Herjolfsnes (Ikigait) I, it was, however, considered expedient to subject the pelvis from Herjolfsnes (Ikigait) II to a similar examination. The result has already been briefly mentioned and will be described in this section in more detail. We remark to begin with that the deformity of this pelvis was somewhat less complicated and represents a more commonly occurring pathologic deformity on a rhachitic basis.

It must be emphasised that it was first very thoroughly investigated and considered whether the state of preservation of the pelvic bones was such that conclusive information could be expected from the more thorough examination of the pelvis. It then appeared that though there were some easily recognisable defects especially anteriorly on the two ossa coxæ, yet in essential points the bones were sufficiently well preserved and exhibited no such post-mortem deformities as to make a reconstruction dubious, the pelvis could be assembled and restored with full certainty, and sure conclusions be drawn from its shape. One of the most conspicuous defects was that the almost paper-thin lamina externa of compact osseous tissue covering the bone surfaces had become detached in places, especially on the lateral part of alæ iliacæ. In spite of the formaline fixation and the very cautious slow drying process this lamina externa was detached from the underlying osseous substance in several places, but as shown in the photos, this was not as a rule the case with the main part of the substance of the bones, which had in all essentials kept their shape well. Moreover there were so many different marks on the bones indicating their original position and connections that the characteristic deviations from the normal type and shape of female pelvis appeared very clearly in spite of the absence of the symphyseal portion and the os pubis. These deviations from normal shape proved to correspond fully with what are known as characteristic features of the diagnosed form of **rhachitic** pelvis, viz. a **flat and asymmetric pelvis** with increased transverse diameter in the superior apertura pelvis, while the inferior aperture showed an expansion and enlargement very characteristic of such rhachitic pelves, (the reverse of Herjolfsnes (Ikigait) I). There were undoubted signs of scoliotic deviation—with torsion of the vertebræ in the lumbar part of the vertebral column, and in addition, a well-marked asymmetry of the pelvis, the right os coxæ and right half of os sacrum being appreciably smaller than the left, while the right tuber ischii was at a higher level than the left. In addition to this the left os coxæ had on its medial aspect posteriorly to facies auricularis (see illustration fig. 54 Tabula XX) a large and very distinct extra impression, quite corresponding to that part of the left side of os sacrum which had during life been pressed hard into the medial facies of the os ilium; a similar but smaller extra impression was found on the right os coxæ corresponding entirely to that difference in the amount of mechanical pressure which the different position of the right and left os coxæ in the reconstructed pelvis required. These facts are illustrated in a series of pictures, see letterpress under plates. (Tabulæ XVII, XVIII, XIX, XX, fig. 48—55).

After these remarks we proceed to the description of the separate pelvic bones, besides shape and conditions in the reconstructed pelvis.

Os sacrum is fairly well preserved. The fusion of the segments is not very old. There are 5 sacral segments, the bone is conspicuously flat, only the lower apex is curved a little more forward. The type is female. It is somewhat asymmetric (cp. the scoliosis in the vertebral column), the left lateral half (corresponding to the well-preserved left femur) being somewhat larger than the right lateral half. The posterior surface is quite well preserved, cristæ sacrales are small. On both sides are found distinct contact surfaces for the corresponding extra impressions on the medial side of the right (smallest impression) and left os coxæ (largest impression). The anterior surface is well preserved; it shows that the fusion, the synostosis between the corpora of the 1st and 2nd sacral vertebræ is still fairly young. The lower end, apex, is curved a little more forward.

Os coccygis could not be found among the skeletal remains. As might be expected it had not become fused with os sacrum.

In its upper portion os sacrum showed a defect in the left side which was not, however, of great significance, since the upper part of the left pars alaris, especially the anterior part of ala, had been partially knocked off during the excavation, and in a few places on both alæ there was some peeling off of the thin lamina externa. The right ala is practically entire, especially the borders, also the entire articular surface, facies auricularis, and the part lying behind this. On the left side more than all the lower half of facies auricularis and the whole of the tuberosity (and fossa) lying behind are well preserved. The position in articulationes sacro-iliacæ may therefore be determined with full certainty, while as a further guarantee we have the above-mentioned extra impressions on the bones. We point out that facies auriculares are somewhat more flattened than normal, the differences in the concavo-convex form of the cartilage-coated articular surfaces not being quite as large as usual.

Table 9. Dimensions of os sacrum. Case II.

Length of os sacrum	11 cm.
Breadth, measured partly directly, partly (on the left) after the position in the reconstructed pelvis, the left side larger than the right	abt.13 + cm.
Index sacralis is thus	abt. 1.18 cm.

Ossa coxæ: The right is considerably smaller than the left (see the illustrations Tabula XVII—XX). The bones are best preserved in their entire posterior and lower part. Specially well preserved are tuberositas ilii and the areas round articulationes sacro-iliacæ and the whole of the corresponding part of crista iliaca, spinæ iliacæ posteriores sup. et inf.; furthermore, all the rest of crista ilii and spina ant. sup. is sufficiently well preserved even if the epiphyses have here and there come loose. All main features can, however, be recognised with full certainty, also in the somewhat eroded parts at the surface, or where lamina externa is partly detached — see the pictures. Incisura ischiadica major and minor and spinæ ischii are well preserved, also the posterior part of acetabulum especially on the right side. Tubera ischii are preserved on both sides in all essentials (see the picture from below), the epiphyses are, however, partly coming loose. Ramus ascendens ischii is almost entirely present on the right side, but partly broken off on the left. Seen especially from the lower aperture these parts prove quite uninjured. Tabula XVIII fig. 51.

Os pubis and the symphysis part are quite absent.

Thus of the hip-joint sockets, acetabula, the anterior part on both sides answering to os pubis is absent. In best preservation is the part formed by os ischii especially on the right side. The part of acetabulum formed by os ilium is somewhat injured inferiorly and anteriorly, particularly eroded inside; the border and surface are, however, distinct to a great extent. As we know from the condition of caput femoris of the entirely preserved left femur and from the preserved uninjured right caput and half of collum femoris dext. that these articular surfaces were uninjured, we may exclude the presence of pathologic changes in the acetabula. The hip-joints were in all probability sound. From the pictures of the assembled pelvis (Tabulæ XVII, XVIII) it appears plainly that both acetabula were placed somewhat more forward than normal (most on the right side). This corresponds with the changes of shape in a rhachitic flat pelvis.

On the internal part of ossa ilium (answering to fossa iliaca) the thin lamina externa has come loose over a great part and become lifted from the underlying bone substance which is not otherwise appreciably deformed. The same is partially seen on the inner pelvic surface anteriorly answering to the right acetabulum. The parts adjoining linea terminalis were, however, quite uninjured and show the shape with absolute certainty. This appears well in the pictures where it is also seen how linea terminalis has plainly enough an, as it were, more incurved part posteriorly laterally and somewhat before articulatio sacro-iliaca dext. et sin., where linea terminalis curves more medially. This answers quite characteristically to the curvature of linea terminalis in the superior aperture of the pelvis in a flat rhachitic pelvis. In the assembled pelvis the transverse diameter is increased and somewhat obliquely placed. From the preserved lower part of the right os coxæ and from the shape of foramen obturatum it is seen how ramus ascendens ischii has curved rather obliquely forward and somewhat upward towards symphysis pubis, which points to a large foramen obturatum increased in breadth. If we consider these parts in the pictures (Tabula XVII—XVIII) of the assembled pelvis seen from the superior aperture and especially from the inferior aperture, we receive a very distinct impression of the more oblique position anteriorly and inwardly of the lower part of the right os coxæ, while the lesser solidity of the right tuber ischii in contrast to the left tuber also plainly appears.

Seen from below (fig. 51) the perfectly preserved adaptation of the borders of the bones by spinæ iliacæ posteriores inferiores (which with a reconstruction in view are left free and uncovered by "plastiline") show how well and unchanged all these parts of the bones are preserved in all essentials, — and at the same time the great increase of the space in the inferior pelvic aperture, and the increased distance between apex (inf.) ossis sacri and spinæ and tubera ischii, appear with great distinctness. In the same picture of pelvis seen from below the large transverse diameter and the inconsiderable development and lesser prominence of spinæ ischii inward is seen very well. It also appears very clearly how the posterior part of the left os ilium curves medially more inward towards the border of os sacrum, while this is the case in less degree with the right os ilium. The obliquity in the pelvis as a whole is extremely characteristic.

If we view the assembled pelvis on the lateral aspect, fig. 52—53 the above-mentioned characteristically increased distance between os sacrum and os coxæ downwardly towards the inferior aperture is extremely pronounced. This is seen especially in the picture taken from the left side, while the picture taken from the right shows both the right and left os ischium and the excellent agreement in the course of the contours on both sides. But the empty space seen is the space on the left side, inside the contour of the space between os sacrum and os coxæ on the right side, of course diminished by perspective. Note also the difference in height between the tubera ischii — the left one descending further than the right one which rested on a lump of "plastiline".

This will easily be understood on considering the obliquity of the assembled pelvis seen from above, when it is recollected that the left part of the pelvis is appreciably larger than the right. In the picture of the pelvis viewed from the left some of the right spina ischii and the anterior part of the border of the right incisura ischiadica major may also be seen, whereas the lower border of the left os coxæ and os sacrum covers these areas on the right side.

Of the assembled pelvis seen from above (Tabulæ XVII, XVIII) we have 2 pictures $^{5}/_{12}$ nat., one showing the superior aperture of the pelvis almost vertically on the latter, so that some of apex (inf.) ossis sacri is seen before the anterior edge of the 1st sacral vertebra. The flat shape of os sacrum appears very distinctly. In this picture is also shown corpus of the 5th lumbar vertebra on the 1st sacral vertebra, so that the anterior border of promontorium is marked off in relation to the pelvic cavity and the superior aperture. The asymmetry and flattening of the superior aperture appears very plainly. It is also seen how the left fossa iliaca is placed more flatly and is larger than the right.

The transverse diameter is directed obliquely to the left and somewhat more anteriorly on that side. Another picture shows the superior pelvic inlet viewed somewhat more from before and above, by which especially the great increase of the outlet downwardly and posteriorly is shown in a striking way, and finally a third picture, fig. 50 shows the pelvis viewed more from before looking towards the anterior facies of os sacrum. In this position the difference in direction of fossæ iliacæ and in the direction of ossa ischii on both sides appears very distinctly. Finally the above-mentioned difference in height between the left and right tuber ischii is easily seen. This difference is also very plainly seen in the picture of the pelvis viewed from the right, in which the left tuber ischii rests on the plane, while the right tuber is supported by a lump of plastiline in order that the superior aperture may be placed at abt. the same level on both sides. It is also seen from before that on os sacrum there is an indication of the familiar tendency in such pelves to form a double promontorium.

As the symphysis portion is absent, diameter recta cannot be taken, but it appears with certainty from the large preserved part of the pelvis that symphysis ossium pubis has been placed more posteriorly towards promontorium and the posterior wall of the pelvis than normally, and that diameter recta must thus have been appreciably, probably considerably, diminished. As mentioned above, the transverse diameter lies somewhat obliquely in apertura superior pelvis and more posteriorly towards promontorium. It is increased and measures at least 14.7 cm.

If we measure the distance between spinæ ischii in cavum pelvis, we get 10.6 cm., and in the inferior aperture the transverse diameter between tubera ischii is at least 10.8 cm., by which it must be recollected that tubera are far from os sacrum and that tuber dext. is somewhat higher up than tuber sin. These dimensions are near the normal average, but compared with the actual size of the pelvis in question they are considerable, and the pronounced backward direction of the lower part of os sacrum caused diameter recta to be larger in the inferior aperture. Cp. normal measures of the pelvis pag. 311.

In a preceding section it was attempted to gain some idea of the breadth of the pelvis at the level of the acetabula by a consideration of the position of the femora. The distance between the bottom of the right and left acetabula was estimated at between 13 and 14 cm. Upon direct measurement of this distance in the reconstructed pelvis the very handsome agreement of 14 cm. was found. Cp. pag. 347.

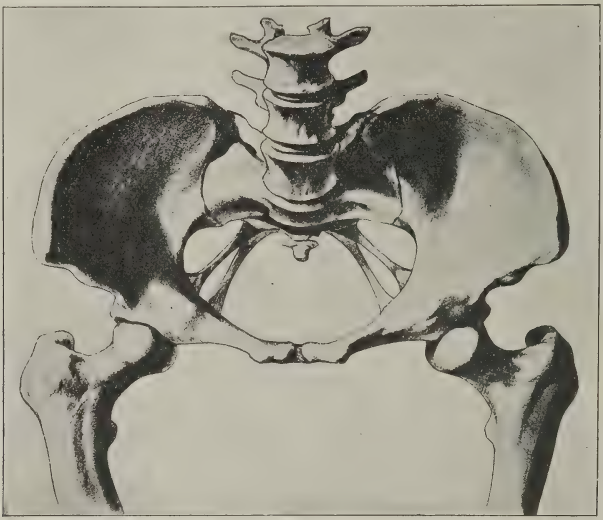

Fig. VII. Flat rachitic pelvis, superior aperture, non-asymmetric (Bumm).

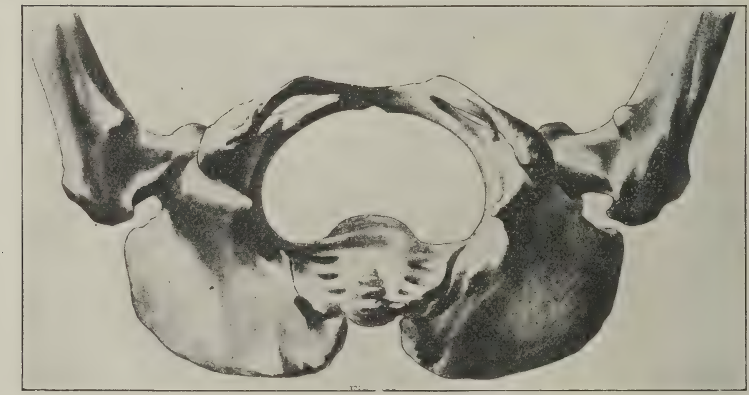

Fig. VIII. Enlarged outlet of flat rachitic pelvis (Bumm).

These determinations were found independently of each other, the reconstruction and measurement of the pelvis being carried out at a considerably later period than the work with the rest of the skeleton.

As we emphasised in the beginning all essential features found in the pelvis of Herjolfsnes (Ikigait) II agree with **a flat rhachitic pelvis.** On comparison of the pictures of this pelvis with the instructive pictures of corresponding pelves in the larger obstetric text books such as Bumm's Lehrbuch d. Geburtshülfe 1912, figs. 390, 391, 392, 394, 395, and 393 (normal), the agreement appears very clearly.

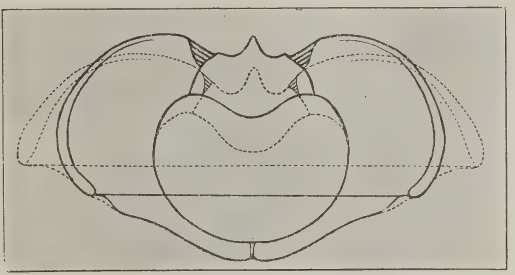

Fig. IX. Mechanism of flat rachitic pelvis (Bumm).

The mechanism leading to the rise of the flat rhachitic pelvis may also be shown in the pelvis from Herjolfsnes (Ikigait) II. As we know, the weight of the body turns os sacrum about its transverse axis in articulationes sacro-iliacæ, by which the upper part of os sacrum presses forward and more towards the pelvic cavity, while the lower part of os sacrum swings backwards. This increases the distance between tubera ischii and os sacrum, and the inferior aperture is expanded, while foramina ischiadica are also expanded downwards. Simultaneously os sacrum is much flattened and sometimes, but not always, the lower apex of os sacrum is drawn much forward by the traction of the ligaments from spinæ and tubera ischii. (This is not very pronounced in Herjolfsnes (Ikigait) II, but there are signs that os coccygis has been directed more forward). But during parturition os coccygis is, as we know, bent backward in articulatio sacro-coccygea.

On ossa coxæ the rotation of os sacrum has the effect that the strong ligamenta sacro-iliaca posteriora draw the posterior parts of ossa coxæ backwards and more medially towards os sacrum, from which comes the above-mentioned deep extra impressions of this bone on the medial side of ossa coxa posteriorly to facies auriculares, most on the left side where os coxæ sin. is turned most medially towards os sacrum. As a result of this rotation of ossa coxæ the anterior portions of these bones towards symphysis pubis will have a tendency to turn off to the side (cp. e. g. text-fig. IX after Bumm 1912), by which the pelvis will become broader in transverse diameter, while symphysis pubis also becomes broader and is drawn backward. Diameter recta will thus be shortened, diameter transversa increased in the superior aperture, and the whole anterior part of the pelvic girdle becomes flatter and is curved more outward laterally in relation to the posterior part of the pelvic girdle (plainly seen in Herjolfsnes (Ikigait) II.) Downwardly, too, spinæ ischii and tubera swerve more or less to the side, in short, the superior aperture is contracted from before backward, whereas cavum pelvis and the inferior aperture are expanded downward. Cp. text-fig. VII, VIII, X, XI. All these features meet the case in the pelvis from Herjolfsnes (Ikigait) II.

As regards the asymmetry various causes may have operated in the unequal deformation of the right and left sides. As there can be no doubt that rhachitis is the affection forming the basis of the deformity of the pelvis, we may with a great degree of probability assume that the scoliosis (cp. text-fig. I, p. 307, and text-fig. II, p. 313) found in the vertebral column (Tabula XIII fig. 38, 39, 40) has also a rhachitic basis (cp. the asymmetry of the skull and the clavicles, Tabula XIV). The scolioses and other deformities of the vertebral column occurring with rhachitis are, however, very variable in their situation, form and extent, and we cannot calculate their form and situation with anything approaching the probability we can attain when an habitual scoliosis is in question. Often the rhachitic scoliosis is associated with some kyphosis. Sometimes the typically compensating deformities in other sections of the vertebral column are absent, we cannot therefore say anything with certainty about the deformity of the vertebral column in case II beyond what has already been pointed out. But it is highly probable that the static conditions involved that one or the other of the inferior extremities was burdened in such a way, walking or standing, that the asymmetry of the pelvis could be explained by that. In this connection

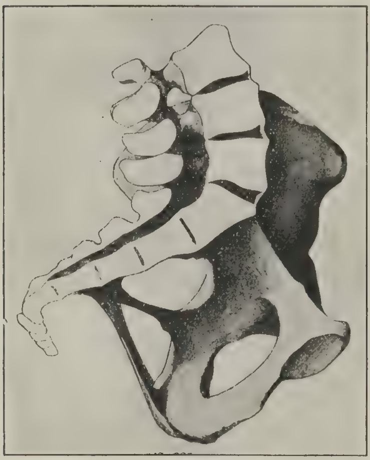
Fig. X. Flat rachitic pelvis, sagittal section (Bumm).

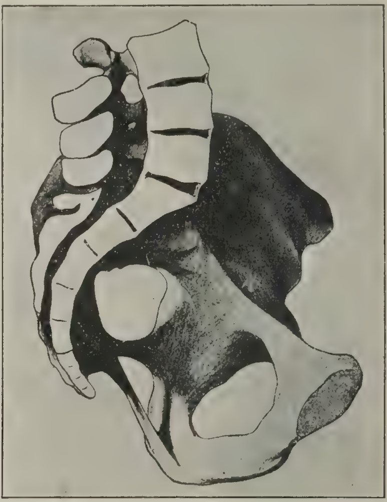
Fig. XI. Female pelvis, normal sagittal section (Bumm).

it is of no interest to enter more closely upon this complicated question, I shall only point out once more the relative frequency with which we have found undoubted anatomical evidence of a considerable and unusual difference between the right and left lower extremities in the very incomplete material of the 25 skeletons found at Ikigait. It is possible, too, that neuralgia in the nerves of the extremities, from which individuals with scoliosis sometimes suffer, especially after all fatiguing movements, may have borne some part — besides special affections in the skeleton or other components of the free extremities. There are, in short, many possibilities of cooperant causes, but on the basis of the material at hand we cannot say which, only that there must have been such.

The shape of the left femur, the asymmetry of the skull, of the shoulder-girdle, of the vertebral column, and the deformity of the pelvis thus bear witness to a milder form of **rhachitis** which has set its stamp on the various parts of the skeleton. (Cp. also case XX). The altered shape of the hip-regions, the back and the pelvis is shown in text-fig. XII, cp. also text-fig. III and IV and the dresses viewed from the back.

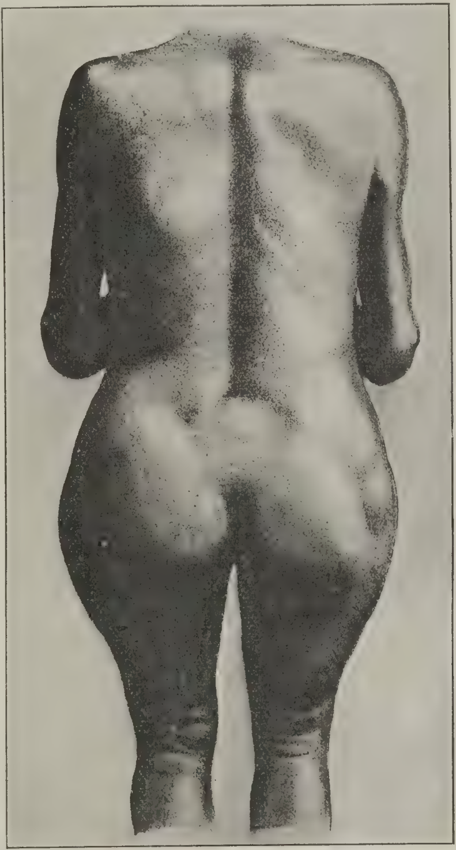

Fig. XII. Back, pelvis and hipregion of a woman with flat rachitic pelvis (Bumm).

It now remains to consider the **influence of the pelvic deformity in the case of a birth,** As we are debarred from measuring diameter recta in the superior aperture and only know that it must at any rate have been smaller than normal, we cannot say anything with certainty as to the degree of contraction on which depends in the main the prognosis and treatment of the birth. The rhachitic flat pelvis is, however, a comparatively frequent deformity, one of those that give rise to difficult births (parturitions) when there is considerable mechanical disproportion between the size of the child's head and the superior aperture of the pelvis. In the lower degrees of contraction, i. e. abt. 9—9.5 cm. and thence to 8 cm. for diameter recta, the birth of a living child by the natural agencies is possible or not precluded. At 8 cm. or a little above lies the limit by which obstetric aid is as a rule absolutely necessary. If diameter recta is considerably below this limit, the **Cesarian section** must as a rule be performed, or the life of the child must be sacrificed in order to save the mother.

The essential obstacle in mechanical disproportion being seated in the superior pelvic aperture, the first part of the birth (labour) will present the greatest difficulties and take longest. The difficulty in the superior aperture being surmounted, the last part of the birth will as a rule be more easy because the pelvis expands downwards. Experience shows that with flat rhachitic pelves the labour pains are exceedingly violent and protracted during the first part of the birth (labour), until the head of the child has been accomodated (moulded) to the contracted superior aperture and passed through. After that the rest of the birth is often easy, for the reasons above mentioned. This perhaps provides the explanation why, in the Middle Ages, the bones of saints and other holy relics might sometimes have a wonderful effect in difficult births. These remedies were not of course employed before the birth had lasted long, belief in them probably increased the expelling forces (the labour pains became more acute (violent)), and when the accomodation (moulding) of the child's head had progressed sufficiently, about the time when the relics where fetched or arrived, the expulsion through the lower aperture often took place easily and swiftly, the pelvis expanding downwards.

But it is a matter of course that the prognosis for mother and child could not be very good even with the slighter degrees of contraction, and as experience shows that in the case of rachitic pelvic deformities irregular positions of the fætus and irregular parturition pains occur more frequently in the later births than in the first birth, the prognosis for mother and child will be less and less favourable for each succeeding birth.

In a small isolated population such as that of the Norse colonies in Greenland rhachitis and the resulting pelvic contractions in the women would in the long run mean **a serious danger to the population** since the outlook for the mother and child in pregnancy and birth would grow less favourable when even slighter degrees of pelvic contraction and deformity grew more common, and for such women the risk increased at each succeeding pregnancy and birth, both for the life of the child and the mother.

Even if a woman after a difficult first accouchement had at the risk of her own life brought a living child into the world, her prospects for successful accouchement grew less and less for the second and third time and when, in addition to this, no effective obstetric aid could be counted upon, and the sanitary conditions were bad, it will easily be perceived **what a source of danger the frequently occurring pelvic deformities must become with regard to the perpetuation of the population and the life of its women.**

Herjolfsnes (Ikigait) 1921(-22). Skeleton IV.

From a hood. Child, aged abt. 11—12. The scant remains consist chiefly of parts of the foot, some teeth, and a few fragments of the skull. Calcaneus dext., os cuboideum dext., and all five metatarsal bones from the right foot can be determined. The epiphyses of the bones and their relative sizes show that the skeleton must be that of a child of abt. 11—12 years, the teeth point to an age of abt. 12. There is a small fragment of one of the flat bones in theca cranii, the structure of the bones also indicates a child's skull, remains of basis cranii show the same.

Of teeth we find molar II (permanent tooth) from the right side of the upper jaw, with low crown, not worn. The tooth has three roots, imperfectly separated, their apices being still a little open, hence not quite developed.

In contrast to this the right lateral incisor in the upper jaw is found much worn down, hardly more than one-third of the crown being left, also the canine tooth of the right upper jaw, much worn. The surface of wear lies lingually. The relative dimensions of the roots and crowns of the teeth seem to indicate teeth of a rather small type.

Taken all together these facts show that the individual must have been a small child of the age mentioned above, with teeth worn down conspicuously early, as we find it, too, in other individuals from the same locality Herjolfsnes (Ikigait).

Herjolfsnes (Ikigait) 1921(-22). Skeleton V.

Adult, powerful individual, probably male.

Only the following determinable remains were found:— Two of the carpal bones from the right hand, viz. one os hamatum dext. (from an adult) which was conspicuously large with large hamulus, a corresponding os triquetrum dext., which indicates that the hand and extremity to which it belonged were large and powerful.

The only other bones found were: 1 small sternal extremity of a rib with groove for the costal cartilage, and 1 small capitulum costæ; 3 much worn molars and 2 premolars from the lower jaw. The dentine appeared on the surface of mastication.

The individual must have been an adult of powerful skeleton The general impression gained from the skeletons from Herjolfsnes (Ikigait) is, that there is a striking number of slenderly built skeletons, and such powerful bones as those of this hand point to a man with strong hands and stout arms, but hardly very tall, perhaps (small costæ and sternum). None of the skeletons, where the height could be determined, show great height. This corresponds well with Dr. Nörlund's impression of the dress (in 1922). After the final examination of the latter I was informed by Dr. Nörlund (Oktober 1923) that in his opinion it was decidedly a male dress of ample dimensions for a broad and stout, not very tall man.

Herjolfsnes (Ikigait) 1921(-22). Skeleton VI.

From a piece of skin which, though not cut out for footgear, is assumed to have been used as such. On the inside of it was a piece of coarse stuff.

Almost adult individual aged 18—20.

Parts of the skeleton of the right foot were found, viz. the 3rd, 4th, and 5th metatarsal bones, and the 3rd os cuneiforme.

The epiphyses showed that it must have been a small individual aged abt. 18—20 years.

The dimensions of the bones pointed to a small individual.

The bones of the foot looked as if they had been somewhat compressed (by too narrow footwear?) It may possibly be the foot of a woman; even in those days, it was considered a mark of distinction to have small hands and feet.

Herjolfsnes (Ikigait) 1921(-22). Skeleton VII.

Adult individual, male., hardly very old, abt. 25—30 years.

(According to Dr. Nörlund's statement (in October 1923), the dress belonging to this skeleton was a man's dress for a fairly well-developed individual).

The skeleton was much decomposed and the remains compressed.

Fragments were found of the right and left thigh bones. (Condyli and caput femoris), the left patella, the extremitas superior tibiæ, and the remains of tarsal bones.

Only the enamel crowns of the teeth were left, the dentine had decayed. There were two crowns of the canine teeth of the upper jaw, rather worn lingually so that the dentine had become denuded; a strikingly small premolar crown (supernumerary?); two crowns of wisdom teeth in the lower jaw (molar III), hardly worn except for a small facet worn by the 2nd molar in the upper jaw, the corresponding wisdom tooth in the upper jaw either not being present or not having had contact with the lower jaw. (The same circumstance noticed in the other finds is seen again here, that the wisdom teeth do not touch their antagonists, or have not been through long enough to be much worn. There are also signs of a late eruption of the wisdom teeth in several cases.

Herjolfsnes (Ikigait) 1921(-22). Skeleton VIII.

Young individual, aged abt. 15—16.

From a hood — subsequently determined as a typical male article of clothing — hence probably a boy.

All the remains were much decomposed, soft, partly crumbling. The inorganic substances, salts of calcium etc. were for the greater part extracted, but the organic substance of the bones was in somewhat better preservation, made brown and tanned by humous acids.

There were remains of the vertebral column, some of the sternum, of the jaws and a single carpal bone. Also teeth.

Of the vertebral column parts of the atlas and epistropheus were determined, also corpora of the other cervical vertebræ and a few transverse processes. Corpora of some thoracic vertebræ were also found, and possibly of one of the upper lumbar vertebræ. The epiphyses of the corpora are absent, and the corpora are small and far from fully developed. Part of the manubrium sterni is found, and, quite by itself, a single carpal bone, much decalcified and compressed, which can be determined as os multangulum majus from the right wrist.

There are remains of the upper jaw and especially of the lower jaw of a young individual of the age stated above. The teeth are not large, comparatively. The enamel of the crowns is well preserved in form, but very brittle and somewhat brown. The dentine, on the other hand is much decomposed, quite decalcified, and the organic substance, the collagene, shows much decomposition. Remains of the shrunken roots are found on the crowns, the enamel of which is easily detached from the dentine. Many of the enamel crowns lie loose and isolated. There are teeth both from the upper and lower jaws. The incisors and canines have quite disappeared. The premolars show much wear, the dentine is denuded on the cusps, one of the premolars in the upper jaw, probably the 2nd on the left, is not worn, however, so cannot have been in normal articulation with its antagonists. The crowns of the large 1st molars (6 years' molars) are much worn, and the surfaces of wear in the left upper and lower molars correspond perfectly to each other in articulation. The cusps are worn down to the dentine. The 2nd molars in the upper and lower jaws are somewhat less worn and only show a comparatively small surface of wear in the enamel, on the lingual cusps in the upper jaws, and the buccal cusps in the lower jaw. Molar No. 2 has thus only been in use a comparatively short time before death. The crowns of the four wisdom teeth are found with some of the root still attaching to them. The lower wisdom teeth are the largest, those of the upper jaw are somewhat smaller, especially one of them. They show no signs of wear.

It is evident from the nature of one of the alveoli of the wisdom teeth in the remains of the lower jaw, and from the appearance of the root of the wisdom tooth, that the roots of these teeth were not yet fully developed. Thus the crowns cannot have articulated and so cannot have become worn. One of the upper wisdom teeth was probably not yet erupted, and none of these teeth had reached contact with the surface of mastication.

Knowing the intensive wear the teeth were exposed to at an early age from the other skeletons in the find, we may, in good accordance with what was found in the vertebral column and the teeth, put the age at abt. 15—16 years.

Herjolfsnes (Ikigait) 1911(-22). Skeleton IX.

Adult individual. From a hood, possibly a man.

Remains of the bones could be distinguished in the earth. Much compressed remains of the right lower extremity were found, thus of the tibia, the fibula, and the tarsal bones.

Herjolfsnes (Ikigait) 1921(-22) X.

Adult female. The character of the skeleton points chiefly in the direction of a small adult woman, and though the dress at the temporary examination was supposed to be a male dress, I was subsequently (in October 1923) informed by Dr. Nörlund that after all it turned out to be for a woman, which was in better accordance with the skeleton. The individual was hardly very old, at the utmost 25—(30?) years, judging by the epiphyses of the vertebræ. The skeleton was much decomposed in some regions, but somewhat better preserved in others, but everything was very brittle and mostly broken. Remains of most parts of the skeleton were found, belonging to a very small and slender individual. Pictures on **Tabulæ XXI—XXX, LXVII and LXXII —LXXIV.**

The skull had been small (compare herewith the small skulls of other individuals from the same locality). Of theca cranii was found the frontal bone, two temporal bones and portions of the occipital bone. In the frontal bone the entire outer lamina could be loosened as a whole from the underlying diploe. The appearance of the frontal bone and the border of the orbits showed predominant female characters. The orbits had been small. Only quite small sinus frontales had been developed. The temporal bones showed a small foramen caroticum and small sulci for sinus transversus, small processus mastoidei, the left one largest, but deep fossæ mandibularis. The cheekbones were small and little prominent, the jaws small; of the upper jaw was preserved corpus and processus alveolaris of the right and left maxilla with part of the teeth. Sinus maxillaris had been large. The lower jaw was small with a small protuberans mentalis which seems to have been somewhat pointed. The left side was in best preservation, ramus mandibulæ was small. Some of the **teeth** were preserved, of others, especially the incisors, only the broken partly decomposed and shrunken roots were left in the alveoli.

As in this find on the whole, the teeth were very brittle, the enamel came off easily, only by drying during exposure to the air, the dentine was very crumbling, partly decalcified. The teeth were small, the dental rows short, there was no sign of caries anywhere. The teeth were much worn with the exception of the wisdom teeth. The incisors were broken or had fallen out post mortem, they had been small. The canines and especially the premolars were worn down a good way into the dentine. The left canine in the upper jaw must have been lost while the individual was still alive, presumably after termination of the growth of the jaw, the alveolus being filled with bone tissue.

On the left side of the lower jaw the 1st molar (the 6 years' molar) was very much worn down just like the two premolars and the canine, the latter, however, somewhat less. The 2nd molar was also worn down but somewhat less worn than the 1st molar, the wisdom tooth was hardly worn and only slightly mesially (anteriorly). The two premolars and the two foremost molars on the left side of the upper jaw were much worn, corresponding to those of the lower jaw, whereas the wisdom tooth on the left side in the upper jaw has been placed higher and not in contact with that of the lower jaw. On the right side of the lower jaw the 1st molar was also very much worn, the 2nd molar somewhat less in the typical places. On the wisdom tooth in the right side of the lower jaw there was only a well-marked masticatory wear facet on the mesial (anterior) side of the tooth, corresponding to the distal cusp of the 2nd molar in the upper jaw, but no wear more posteriorly answering to the wisdom tooth in the upper jaw. In the teeth of the right upper jaw the wear was quite similar to that of the left in the 1st and 2nd molars, but there was no wear of the wisdom tooth which had not been in contact with that of the lower jaw at all. Thus the wisdom teeth of the lower jaw were only little used, those of the upper jaw not at all, or they were not in contact with their antagonists. Compare what is said under case No. XVII on the teeth in general.

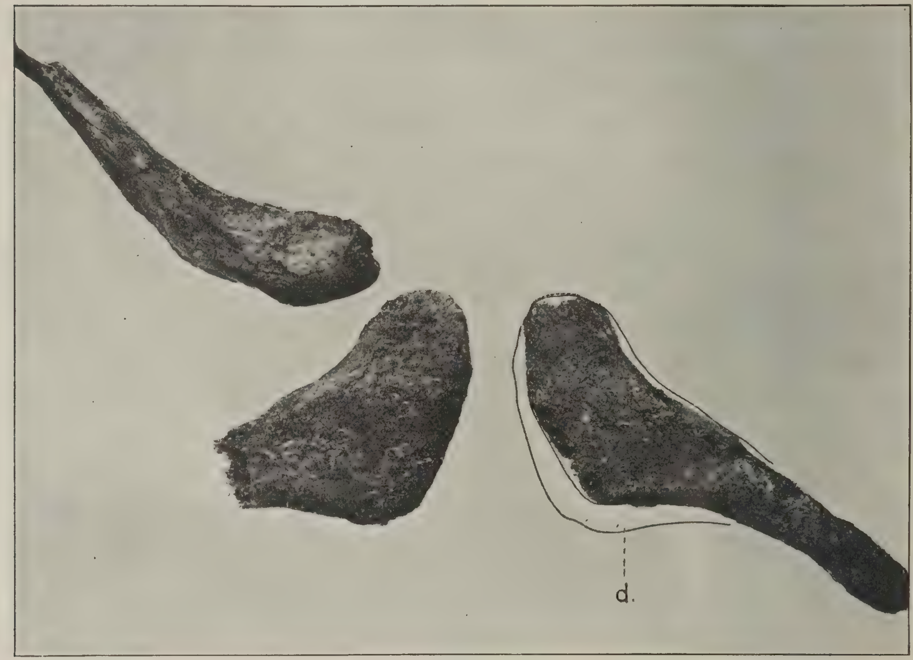

Fig. XIII. Herjolfsnes X. Right clavicle and right acromion compared with the left acromion. *d* is the outline of acromion dext. superior facies. $^1/_1$ nat. size.

According to the wear of the teeth and the appearance of the vertebral column and the skull the individual was hardly very old, at most 25(—30?) years. It should, however, be taken into account that the wisdom teeth may have erupted rather late.

The remains of the superior and inferior extremities confirmed the assumption that it was a slender individual of small stature. By carefully going over all the fragments, remains of the small claviculæ were found, especially of the acromial part of the right clavicle and, in addition, fragments of processus acromion of the right shoulder-blade and of that of the left shoulder-blade with a considerable portion of the free border of spina scapulæ (see textfig. XIII and picture Tabula XXI fig. 56). The very great difference in size (breadth especially) between the larger right and the considerably smaller left acromion is striking. In the figures XIII and 56 the outlines are for further comparison placed above one another in identical places by which the difference is plainly seen. The examination of the mostly uninjured edges of the bones and the structure of the bones shows that acromion and spina scapulæ on the left shoulder-blade were considerably less developed — atrophic — than on the right shoulder-blade. This is not the simple difference due to the normal difference between the right and the left arm, for this it is too great. It must be an **atrophy of the left shoulder region** and possibly of the whole superior extremity which set in presumably in youth. Possibly there has been paralysis or weakening of the shoulder muscles, for instance of musculus deltoideus and others, after a fracture of collum humeri by which nervus axillaris has been paralysed or the shoulder has been out of joint, or possibly paralysis of the muscles after an affection in the shoulder joint or paresis after pressure on plexus brachialis. It is fortunate in this respect that remains of the lateral angle of both shoulder-blades have been preserved, viz. caput scapulæ and collum scapulæ with the articular surface, cavitas glenoidalis, for caput humeri. As shown in the figures 57, 58, 59, 60 in Tabula XXI, cavitas glenoidalis of the left scapula and the adjacent parts are considerably smaller than that of the right.

Table 10. Dimensions of right and left cavitas glenoidalis. Case X.

Cavitas glenoidalis	Height	Breadth	Area measured in plane projection
dext.	30 mm	20 mm	abt. 450 mm²
sin.	25 mm	abt. 17 mm	abt. 260 mm²

It must further be pointed out that while the bone surface which was covered with cartilage during life is smooth on the right side, it is slightly granular in the left cavitas glenoidalis cp. Fig. 58. It would seem that the articular cartilage has been thinner here or perhaps changed, or it may have disappeared, perhaps owing to defective function of the shoulder joint on the left side.

On microscopy of the articular surfaces, calcified cartilaginous tissue was found adhering to the surface of the right cavitas glenoidalis, while the left articular surface only showed osseous tissue. Further considerable remains of processus coracoideus in both these fragments of the right and left scapula are preserved. It is plainly seen in the figures 58 and 60 Tabula XXI that the left processus coracoideus is not a little smaller than the right. All these phenomena indicate a functional hypoplasia (atrophy) of the shoulder

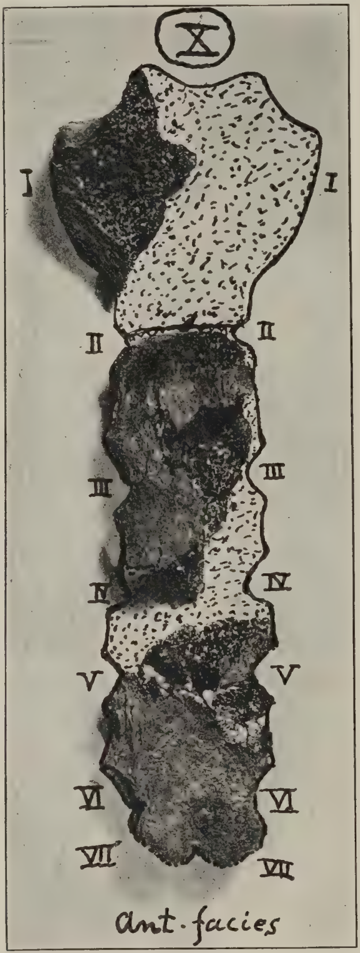

Fig. XIV. $^1/_1$ nat. Sternum reconstructed (Case X) anterior facies.

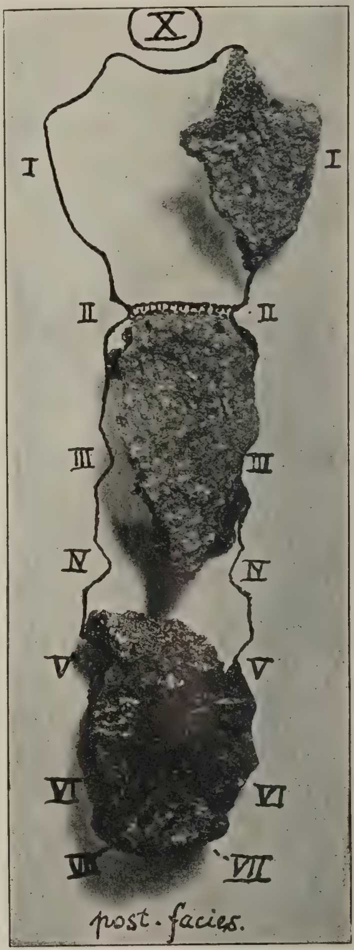

Fig. XV. $^1/_1$ nat. Sternum reconstructed (Case X) posterior facies. NB. Cloth (hemp).

of the left side, and at any rate of the humerus perhaps of the skeleton of the total left superior extremity, perhaps in connection with the leftsided torticollis (wryneck) seen in the vertebral column.

Of **sternum** the right lateral region of manubrium with a small facies articularis for clavicula was present, also, as shown in the textfigures XIV and XV, the greater part of corpus sterni, so that the size and shape of the sternum could be reconstructed with certainty. It was very small and narrow, in all only abt. 10.5 cm. long (without processus xiphoideus). Breadth of manubrium was abt. 36 mm.! Corpus was only abt. 22 mm. broad, which corresponds well with the whole habitus of the skeleton.

In the figures are seen the front and back. The latter (the back!) fig. XV is covered with remains of coarse-woven material of a vegetable substance, most like **hemp,** of quite the same sort as was found adhering to the front of the dorsal vertebræ, see these Tabulæ XXVI fig. 78 and XXVIII Fig. 82. As now the material was found adhering to the back of sternum, it is obvious that it must have stuck to the back of the sternum after this bone had fallen into the thoracic cavity upon decomposition of the body, with its posterior side upwards to the front beside the thoracic vertebræ (compare with this that in another individual (XX), manubrium sterni was found adhering (Tabula XLII fig. 130) to the front of a couple of dorsal vertebræ).

The components of **the vertebral column** were on the whole small, as the photos show. As the case in hand presents features of considerable interest, the preserved parts of the vertebral column have been as extensively figured as possible (see **Tabulæ XXIV—XXX,** also for the purpose of rendering possible the application of the possibly more extensive knowledge of a later time to this material. For in the uppermost of the cervical vertebræ, **atlas,** there are undoubted signs of the presence on the **left** side of the affection called wryneck, **torticollis,** caput obstipum, probably originating from a muscular shortening of the left musculus sterno-cleido-mastoideus. The preserved parts of the cervical vertebræ are atlas, epistropheus and the 3rd to the 7th vertebra cervicalis to which may be added the 1st vertebra dorsalis. These vertebræ are shown in Tabulæ XXIV—XXVIII and XXIX in 1) a row seen from before, 2) in a row seen with the upper surfaces directed forward, 3) in a row with the lower surfaces directed forward. In the next figures are shown the 2nd—7th vertebræ cervicalis and the 1st vertebra dorsalis joined with "plastiline", and as much as possible in accordance with the shape and impressions in the vertebræ themselves, in order to give only some idea of the approximate shape of this part of the vertebral column. The quantity of "plastiline" is, especially upwards, somewhat less than answers to disci intervertebrales, but this was to ensure the greatest possible mutual orientation of corpora. The arches with most of processus articulares are unfortunately almost entirely absent, but in the three assembled columns (Tabula XXVII fig. 79—81 a) seen 1) from before, 2) from behind, and especially 3) from the left side, it may be plainly seen how especially inferiorly, opposite the 7th vertebra cervicalis and the 1st vertebra dorsalis, there is a pronounced convexity posteriorly, kyphosis, while the whole of the cervical portion of the vertebral column shows considerable flatness or convexity dorsally in contrast to the normal cervical lordosis with convexity anteriorly. The form occurring in this case corresponds very well with what may be found in certain cases of torticollis. There is also especially superiorly in the 2nd and 3rd—4th vertebræ cervicalis an unmistakable rotation forward to the right, of these vertebræ, especially the two uppermost, corresponding to the leftsided torticollis. One of the few cervical vertebræ in which the left processus transversus and the processus articulares with the articular surfaces of the left side are preserved is the **4th vertebra cervicalis.** In the figures of it (Tabula XXVI fig. 73—76), both in the assembled column and separately, it is very plainly seen how the small bone column which normally supports the articular surfaces of the processus articulares of the cervical vertebræ have been pressed obliquely forward. It is seen especially superiorly so that the whole of this portion of the vertebra is somewhat lower than it should be. Also in the anterior uppermost edge and anterior surface of the 5th vertebra cervicalis we find an unusually well-marked obliquely descending facet (Tabula XXVI fig. 77), which obviously enough has been caused by pressure from the lower side of the lowermost anterior border of the overlying 4th cervical vertebra (unfortunately broken off). This, too, indicates a greater anterior flexion than normal of the cervical vertebral column. It may be stated that the vertical height of the cervical vertebræ measured in front from the basis of dens epistrophei to the lowermost edge of the 7th vertebra cervicalis (i. e. without atlas) is 80 mm. If the 1st vertebra dorsalis is included it is 93 mm.

All the phenomena here described would tell us nothing certain in themselves as the vertebral arches are absent, if we had not had those parts of atlas which provide special evidence and which first directed attention to these abnormal conditions.

Fortunately both massæ lateralis with articular surfaces and processus transversi of **atlas** were well preserved, for even if arcus anterior et posterior atlantis are absent, this is unimportant, as the mutual position of the preserved parts may easily be ascertained on comparison with epistropheus (see the picture of the cervical vertebræ viewed from before). In **Tabulæ XXIV—XXV** fig. 67—72 is shown a series of figures of the massæ laterales of atlas, seen from above and below, before (fig. 81 b), behind, and from the side etc. From these the great differences between the right and left sides will appear very plainly.

If we consider the left massa lateralis atlantis from above and behind and compare it with the right side (and with a normal atlas), we shall see how the left is very broad and clumsy. At the top is seen a large somewhat hourglass-shaped concave and cartilage-coated articular surface for the left condylus occipitalis, but instead of having as normally, only a narrow border of bone laterally, we find here a very large and broad osseous surface, not coated with cartilage and having a slight depression in the centre, anteriorly and especially laterally to the articular facies. This surface is the upper part of an osseous mass which is, as it were, pressed out laterally to the articular facies, and seen from behind appears as an osseus torus which projects above an enormously deep groove for arteria vertebralis, the sulcus of this artery being easy to follow here, and it is seen how the artery has kept its place while the osseous substance of massa lateralis sin. has been forced out laterally over the artery. The left processus transversus atlantis is strikingly thick, broad, and obliquely placed inferiorly anteriorly to posteriorly superiorly (compare herewith that of the right side which is considerably smaller and shows more normal conditions).

The medial part of massa lateralis sin. passes medially into a cuneiform edge and surface (where the attachment of ligamentum transversum atlantis is seen) and which inferiorly on the lower side directly adjoins the medial border of the large round lowermost articular surface (articulating with a corresponding facet on epistropheus). This facies articularis inferior atlantis is concave inferiorly and especially oblique in the lateral portion. The inferior articular surface is here only well-preserved in the posterior and lateral part, i. e. in the part where the left inferior articular surface of the atlas by rotation forward to the right rests in a position of contact with the anterior part of the uppermost articular surface on the left side of epistropheus (see the figures 68 and 72 from below in Tabulæ XXIV and XXV).

The right massa lateralis is somewhat smaller and does not deviate nearly so much from the normal; the articular surface for the condylus occipitalis looks more normal, and sulcus for art. vertebralis also looks more like the ordinary type. Nor is the pronounced cuneate form seen in the right massa lateralis (compare also the impression of ligam. transversum atlantis).

Epistropheus (the 2nd vertebra cervicalis fig. 79—81 b) is small like the rest of the vertebræ. Corpus lacking dens is present, and, broken off from the rest, arcus with processus spinosus. The left processus transversus has fortunately been preserved, and it can be seen that art. vertebralis has been rather small. The upper articular surfaces have been injured, the lower are, however, preserved and are rather small. Processus spinosus is comparatively small with a flat groove on the lower side, and the impressions of the muscles belonging to stella epistrophei are very little pronounced, which indicates a certain inactivity of the muscles of the neck.

The rest of the cervical vertebræ show partly preserved processus transversi on the left side, so that it may be seen that foramen transversarium has been small (small vessels!) the nerves have not been large either.

The findings in atlas may be explained quite naturally by the presence of a **torticollis on the left side** (see the figure XVI in the text p. 376).

The most frequent cause is contracture of musculus sterno-cleido-mastoideus, by which this muscle is chronically kept abnormally contracted, and is finally permanently shortened and may undergo a fibrous transformation. A torticollis may be due to several other causes, but the one here mentioned is by far the most frequent, and in this connection it will be of no interest to enter upon all the other forms or upon conjectures as to the pathogenesis. The muscular torticollis above-mentioned may either be congenital (rare), or acquired sometimes during birth, at other times after birth. If it arises early in life the changes will as a rule be more pronounced. The changes in the position of the head and neck due to wryneck (torticollis) on the basis above-mentioned (contracture for instance of musculus sterno-cleido-mastoideus) are briefly as follows:—

When the left musculus sterno-cleido is contracted the occipital region will be pulled backwards and downwards and simultaneously rotated forward on the left side. The left ear and the left processus mastoideus will also be lowered towards the left side and at the same time rotate forward. The face will therefore be turned towards the right at the same time as the mental region is lifted somewhat. The cervical vertebral column will be flexed to the left on the affected (left) side and at the same time rotate somewhat to the right with the anterior surface. Sometimes the normal convexity anteriorly in the cervical vertebral column will be increased, in other cases it is diminished, or is changed to the reverse, convexity posteriorly, as in this case. The movements taking place under these conditions in the joints between the skull and the 1st cervical vertebra, and in the joints between the 1st and 2nd cervical vertebra, and which are of most interest to us in this connection will briefly be as follows: When the left musculus sterno-cleido-mastoideus stands contracted, the left condylus occipitalis will exert a specially strong pressure towards the upper side of the left massa lateralis atlantis, the head being lowered on the left and posteriorly; simultaneously atlas will move a little to the left. In the right atlanto-occipital joint the reverse will happen. The chief part of the rotation to the right of the head, as we know, takes place in the joints between the lower side of atlas and the upper side of epistropheus and between dens epistrophei and arcus anterior atlantis and ligamentum transversum atlantis. By this rotating motion to the right corresponding rotating displacements in the underlying cervical vertebræ will be important, too, as they will be added to the amount of rotation though in a diminishing degree downwards. It is now easily perceived how the deformity found in the left massa lateralis quite corresponds to what must be the effect of such a chronically acting change of position as a leftsided torticollis arising early in life, and we must consider the finding, as here described, as a direct proof thereof. It is now easy to explain the deep sulcus for arteria vertebralis found in the left massa lateralis atlantis. For if we call to mind the course of arteria vertebralis in relation to massa lateralis atlantis where it first runs from foramen transversarium in processus transversus atlantis up on to the side of and afterwards turns laterally and behind massa lateralis to reach the spinal canal, we shall easily understand how the increased pressure of the left condylus occipitalis which, during growth, has forced the "plastic" growing osseous tissue of massa lateralis outwards laterally and posteriorly, meets with resistance from the large pulsating artery during the outward growth of the osseous tissue, so that the bone certainly grows over the artery, but at a respectable and suitable distance from it. Analogies are well known from other cases where arteries and osseous tissue meet.

If we further consider how the course of the artery will be influenced when the skull with atlas rotates to the right around the vertical axis through dens epistrophei, we shall get the following result: When the head is turned to the right, processus transversus atlantis sin. will go further forward in relation to the fixed epistropheus; as now arteria vertebralis sin. inferiorly passes through foramen transversarium of epistropheus, the distance from the processus transversus of this vertebra up to foramen transversarium in atlas will naturally be increased on the left side during the rotation of the face to the right. Hereby arteria vertebralis sin. will be more stretched and exert a traction both inferiorly towards epistropheus and at atlas, and simultaneously the conditions of circulation in this artery will become less favourable on the left side. On the right side, on the other hand, the reverse will occur: The tension of arteria vertebralis dext. will grow less, and the conditions of circulation will become more favourable. These changes are easily proved by experiments.

Such a chronical torticollis will also influence the skull. On the affected side (in this case the left) the bones will be checked in growth, particularly the facial bones will be smaller on that side, whereas the opposite healthy (right) side will become longer and more convex. Sometimes this asymmetry of the face may be a great disfigurement. It is worth noting that though only comparatively little of the skull has been preserved in the present case (Herjolfsnes (Ikigait) X), yet the right and left **ossa temporis** show a distinct difference, which is due to the very fact that the left musculus sterno-cleido-mastoideus has exerted a constant strong traction on the region round the left processus mastoideus. For we find the left process very distinctly drawn somewhat longer than the right, and with stronger muscular impressions on the left, even apart from the osseous tissue having come off on the right. Further we find corresponding to the other changes that the left fossa mandibularis see figures 61—66 a. b. in Tabulæ XXII—XXIII is appreciably broader in the sagittal direction (anteriorly—posteriorly) in its lateral part, and also more triangularly expanded laterally, and less deep than in the right os temporis. the left tuberculum articulare being flatter. There is also a particularly strong impression from the ligamentum temporomandibulare laterally. Conversely fossa mandibularis is appreciably deeper and narrower in the sagittal direction on the right side.

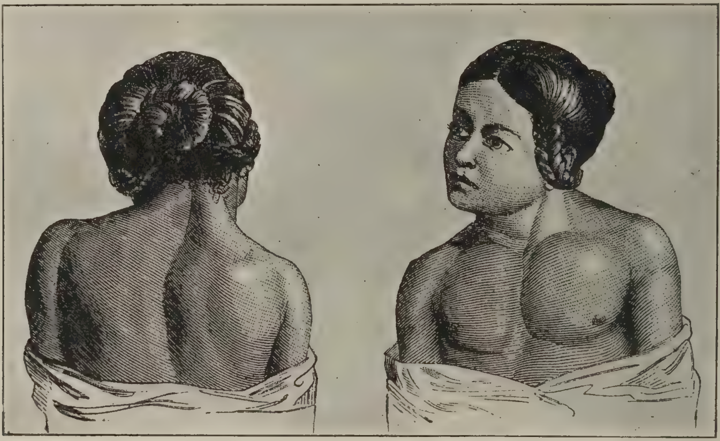
Fig. XVI. Torticollis sin (Duplay et Réclus).

It is a well-known fact that the effect of a torticollis appears in a very characteristic position of the head, neck, and shoulder (see the appended figure XVI taken from Duplay et Réclus: Traité de Chirurgie, Tome V, p. 713 (1891)). To the changed curvature of the cervical vertebral column answers a compensating reversely directed curvature further down in the vertebral column.

The anatomical changes which may be caused by a torticollis are, however, often conspicuously small or apparently disappear quickly after operation. We do not intend to enter more closely upon this subject here, but refer the reader to the literature mentioned in the list. We point out, however, that, until a few years ago at any rate, there was only a small number of anatomically well investigated cases of torticollis, which we cannot wonder at since this affection so rarely causes death. Sometimes it is expressly emphasised how comparatively little pronounced the changes in the skeleton often are.

To meet the case I have thought it right to show also the rest of the vertebral column, viz. vertebræ dorsalis III—X in **Tabulæ XXVIII and XXX** figures 82, 85, 86, They are given in almost natural size seen from 1) before, 2) from above, and 3) from below. Hardly anything but corpora were found. The sequence could, however, be determined with great certainty. The reader must not be surprised that the shape does not always seem quite normal, on the contrary, on a closer study, these vertebræ, too, show that the individual in question had various anomalies in the skeleton.

There are very well-preserved remains of some **cloth of vegetable substance** (presumably hemp) on the anterior surface of the vertebræ, we show particularly the 10th dorsal vertebra on a $^5/_3$ nat. magnified scale in Tabula XXVI Fig. 78.

On the sup. and inf. surfaces of a few vertebræ we still see the remains of plant-roots which have grown into the skeleton before the ice came and stopped all change (Tabula XXX fig 85—86).

For the sake of completeness and to give the reader some idea of the size of the vertebral column we give the dimensions of sections of the dorsal vertebral column:

Table 11. Height of the corpora of vertebræ dorsales III—X collectively. Case X.

measured anteriorly	measured posteriorly
v. d. III—VI 57 mm.	62 mm.
v. d. VII—X 63 mm.	70 mm.
total 120 mm.	132 mm.

Average 126 mm.

Added together the anterior surfaces of corpora thus form a curve of 120 mm., the posterior surfaces a curve of 132 mm., by which the pronounced dorsal convexity posteriorly would seem to be expressed (the average will be 126 mm.).

We may then form an estimate of the height of the cervical vertebral column and the thoracic vertebral column from the 2nd cervical vertebra to the 10th dorsal vertebra inclusively as shown below. The individual being young we may put the thickness of disci intervertebrales at $^1/_4$ to $^1/_3$ of the height of the corpora.

Table 12. Case X.

V. cervic. II—VII	80 mm.	106 mm.	136 mm.
V. dors. I (+ II) 2 × 13	26 mm.		
+ disci intervert		30 mm.	
V. dors. III—X	126 mm. (average)		166 mm.
+ disci intervert	abt. 40 mm.		
		Total...	302 mm.

This length of the vertebral column will presumably including 1st vertebra cervicalis answer to 31.5 cm. from the basis cranii to discus between the 10th and 11th dorsal vertebra, not taking into account the spinal curvatures, and gives us a good idea of **how small the individual was.** It corresponds very well with the small sternum, too.

It would seem natural to connect the atrophy which we showed had been present in the left shoulder region (acromion and caput scapulæ) with the leftsided torticollis. An entirely absent or strongly reduced functional ability of the left shoulder region in a torticollis on the same side is not unknown. There is also a possibility that pressure on the large spinal nerve trunk's leaving the foramina intervertebralia on the left side to proceed to the left neck region and left superior extremity may have had an influence. Finally it is possible that both the torticollis and the atrophy in the left shoulder region may have had a common cause, for instance an affection that arose during birth, as is sometimes seen. But there are many possibilities, more than are mentioned here. The material being so defective it is already a great thing after a space of abt. 500 years to be able to show positive anatomical changes of the nature described, and though they were discovered at entirely different stages of the investigation, they furnish us with a possibility of understanding the connection between the affections from which the individual suffered.

Finally we call attention to the fact that the epithet "Skakke" borne by the well-known earl Erling Skakke († 1179) means" wryheaded".

Lastly we shall mention that a **microscopical examination** was made of the remains of the coarse cloth of vegetable substance found adhering to sternum and the vertebræ. The fibres reminded one mostly of bast fibres of hemp, as in case I and case XVII. Part of the material was much attacked by bacteria. Remains of human hairs were also found, with very little medulla, much attacked by bacteria. To parts of the skull adhered pieces of cloth of coarse texture. Microscopy showed that it consisted of fine and coarse sheep's wool.

Further, microscopical examination was made of the **osseous tissue** from lamina externa of the frontal bone. It gave the following results: The osseous tissue could easily be split up into thin flakes as it was almost quite decalcified. The collagene bundles of connective tissue were very plainly seen in several places, tanned by humous acids. The osseous cavities, bone corpuscles, with all their delicate ramifications were very distinctly visible. They were filled with a finely grained brownish yellowish mass, which must be assumed to represent the protoplasm of the bone cells chemically fixed by humous substances. In a few of them was observed an oblong darker spot, most probably representing the nucleus of the cell.

On the microscopical examination of the **dental tissue** see below chapter XI and Tabula LXXXV, fig. 259, microphoto of enamel substance.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XI.

Adult individual (over 35 years) probably male. (According to Dr. Nörlund's statement in September 1923 the dress was a male dress).

There are abundant remains of the bones, but for the most part greatly changed, partly decomposed, decalcified or broken. It is, however, quite evident that the skeleton must have belonged to a fairly powerful individual, there are fairly strong traces of the offspring and insertion of the muscles on the bones.

Numerous remains of the vertebral column are present, especially of corpora vertebrarum which are rather large. The bones of the pelvis are decalcified, shrunken, broken or decomposed, it can, however, be seen that the 1st coccygeal vertebra is fused with the apex of os sacrum. The other coccygeal vertebræ are absent. This fact speaks against the skeleton being that of a young woman, but in favour of it being that of a man.

Of the ribs there are numerous fragments. They are decomposed, decalcified, bent together. It is recognisable that some of the lower ribs were rather large at the vertebral extremity. Well preserved is costa II sin., but it is rather slender. Corresponding to this we find manubrium sterni partly well preserved. It is small, corresponding to the rib; the articular surfaces for the clavicles are small. This indicates a comparatively slender development, at any rate of the upper part of the thorax and the shoulder skeleton, even if the greater part of the bones may have become somewhat diminished by partial decalcification and some shrinking. Of the skeleton of the superior extremities is found: of humerus dext. (without caput which is broken off at collum chirurgicum) the diaphysis in tolerable preservation, and extremitas inf. humeri. The bone is fairly stout with well-marked traces of the muscles, especially the insertion for musculus deltoideus. Humerus sin., on the other hand, is quite flattened and seriously damaged. Further we find the upper extremity of ulna dext. in tolerable preservation, corresponding to humerus. The radius is present, but quite damaged. The carpal bones are comparatively small, judging by the remains of os multangulum maj. sin. and os lunatum sin. In addition to the fragmented remains of comparatively small metacarpal bones and a few phalanges amongst which the terminal phalange of the thumb, we find the metacarpal bone of the right thumb, it is small, short, but well preserved. There seems to have been a healed oblique fracture in the basal third of the bone, with a slightly shortening radial and a volar deviation of the distal fragment, so that the metacarpal bone has become more volarly curved after healing.

The muscles, at any rate of the shoulder and upper arm, thus seem to have been fairly well developed, even if the skeleton of the shoulder region, the arms, and the hands has been rather small. Of the skeleton of the inferior extremity a rather large left femur is found, of which, however, the upper extremity is absent. The lower extremity of femur has a conspicuously short sagittal diameter of condyli femoris, especially the medial condyle. The left femur without extremitas superior is 400 mm. long. On an estimate, formed by comparison with similar femora from the Herjolfsnes (Ikigait) find, the total length may be put at abt. 440—450 mm., the trochanter length at abt. 420 mm. The **height** is calculated to be ab. 162—163 cm.

Herjolfsnes (Ikigait) 1921(-22) Skeleton XII.

Adult woman abt. 142 cm. in height. The upper part of the body and the arms must have been comparatively more slender than the lower extremities.

Of the skeleton is found:

Remains of the vertebral column, especially remains of the lumbar vertebræ. One loose 1st coccygeal vertebra.

Of the skeleton of the superior extremity is found the distal part of the left humerus, and the proximal part of the left ulna, also the proximal parts of the right ulna and the right radius. All these bones of the superior extremity are small, slender bones; further we find os pisiforme dextrum.

Of the small, thin ribs there are a few fragments.

There are fragments of ossa coxæ with strongly marked tuberositas cristæ iliacæ (for tractus ilio-tibialis), thick tuberositas ilii on the medial side posteriorly, and tuberositas for musculus glutæus maximus well-developed, also powerful tubera ischii.

Both femora are present, capita femoris and extremitates inferiores are broken off but present, so that the length of femur may be approximately determined (the left femur is in bad preservation). Some platymery opposite the insertion tuberosity for musculus gluteus maximus.

Table 13. The dimensions of the femora. Case XII.

Right femur	approximate total length abt. 380 mm.
— —	trochanter length abt. 365 mm.
Left femur badly preserved	approximate total length abt. 365 mm.
— —	trochanter length abt. 348 mm.

The appearance of the bones of the superior and inferior extremities point with certainty to a woman. There are no traces of epiphysis lines anywhere.

The contrast between the slender bones of the superior extremeties with feebly marked muscular impressions, and the relatively more strongly marked muscular and ligamental impressions on the hip-bones and thigh-bones indicate work involving less effort for the muscles of the upper extremities in contrast to those of the lower extremities which have perhaps gained much exercise in walking and other motions (and possibly in dancing which was a favourite pastime). Perhaps this was a woman who was not obliged to do much manual work or carry things, but was not averse to exercising her legs. (Compare as a contrast the bones of the superior extremities in case XX where there are signs of hard work at an early age).

The **height** is approximately calculated at abt. 142 cm., see below.

Herjolfsnes (Ikigait) 1921(-22) Skeleton XIII.

No certain dress. Adult individual, not well-grown.

Skeletal remains of the pelvis and the vertebral column.

Of the inferior extremities are only found the diaphyses of the femora which exhibited some platymery, and one patella.

Further are found remains of carpal bones and of the fingers, and fragments of the other bones of the superior extremities.

All belonging to an individual of adult life, but not large.

Herjolfsnes (Ikigait) 1921(-22) Skeleton XIV.

Adult individual. From the dress nothing could be determined with certainty.

Skeletal remains of the diaphyses of the femora and caput femoris, of patella, and some fragmina without interest. All belonging to an adult individual.

Herjolfsnes (Ikigait) 1921(-22) Skeleton XV.

In all probability a young woman, judging by the whole appearance of the skeleton. The dress presents no conclusive evidence. From the epiphyses of the bones the age may with considerable certainty be inferred to be between 20 and 25, most probably abt. 22. The individual has been small and extremely slightly built, unusually narrow across the shoulders, and narrow at the hips with unusually slender bones. The left inferior extremity has been much feebler and thinner than the right. The height of the body must have been abt. 138—140 cm., hardly more.

The proportions of the extremities show that the tibiæ were, comparatively, too short, but the upper arms too long. All the skeletal remains were very brittle and frail, some were well preserved, others rather badly preserved, especially on the surface which peeled off easily. **Pictures on Tabulæ XXXI—XXXVIII.**

Of the skull only some trifling fragments remained from which nothing could be concluded.

Of the vertebral column some small isolated corpora vertebrarum were present, especially from the lumbar region; the epiphyses had fallen off and had not been fused. (On os sacrum see under the pelvis).

Of the skeleton of the thorax some very small, much deformed ribs were present. The 1st and 2nd costæ were fairly well preserved. Of the sternum was found a rather small manubrium, almost as long as broad, (see pictures fig. 90—92 Tabula XXXI), the upper border of which was, however, rather thick, and which resembles the sternum from individual XX. Incisura suprasternalis is low and very little pronounced, the articular surfaces for claviculæ are comparatively large and somewhat oblique, the right one being somewhat broader and larger than the left. The 1st costal cartilage has been rather broad, whereas the semi-incisura for the 2nd costal cartilage is not large. Corpus sterni has, in proportion, been a little narrower than manubrium.

Of the shoulder girdle we find the right clavicle and the right acromion with its articular surface broken off from the right scapula (which is absent). The small, left scapula is, however, present in part though devoid of the acromion. In type it calls to mind the scapula from case XX. (See illustrations of case XX Tabula XLIII).

The right clavicle (Tabula XXXI fig. 87—89) shows certain peculiarities. It is rather small and slender. The lamina externa tends to peel off, especially on the upper side, laterally to the centre. Seen from above and below it shows the usual S-curve. The sternal extremity is peculiarly broad and flattened, so that the triangular articular surface for sternum lies on the lower side and somewhat anteriorly, though an in the main merely postmortal deformation seems out of the question. The upper surface of corpus passes medially into the upper surface of the sternal extremity, but medially, in front and behind, the edges of the latter have been in part split off postmortally, but the spongiosa structure seems fairly uninjured and shows no distinct signs of postmortem deformity. The sternal end also fits to incisura clavicularis when the intermediate discus articularis is taken into account. The flattening of the sternal extremity must therefore be supposed to have arisen in the main intra vitam. Laterally to facies articularis there is a very strong impression of ligamentum costo-claviculare (rhomboideum) between clavicula and the 1st costal cartilage and the sternal end of the 1st costal bone.

The extreme end of extremitas acrominalis claviculæ also gives one the impression of being rather broad viewed from below, but the edge with the articular surface for the right acromion had broken off. Its size may, however, be seen in the broken off right acromion. A peculiar change in shape manifests itself in the position of extremitas acromialis in relation to the rest of the bone. For there is an unusual downward bending of the acromial end in relation to the rest of the bone. The illustration fig. 88 show very plainly the lateral depression of the acromial extremity of the clavicle simultaneously with a torsion of this part of the bone, so that margo posterior, with the insertion of the strong musculus trapezius is lifted upward, while the anterior margin of pars acromialis claviculæ with the origin for musculus deltoideus is somewhat lowered anteriorly and in increasing degree laterally. In this way the superior surface (fig. 87) of pars acromialis is turned somewhat more forward and lowered laterally. The inferior surface, which is seen in the figure 89 in Tabula XXXI from behind and from below, shows very plainly partly the posterior surface of the bone, partly how the bone on the inferior surface has been much drawn out by ligamenta coraco-clavicularia, but there is a small sulcus for musculus subclavius. The displacement of the acromial extremity is seen with special distinctness from before. As the most probable explanation of this transformation an earlier fracture of the clavicle in the acromial extremity within the areas of the strong insertio or origo of musculus trapezius and musculus deltoideus suggests itself. The displacement of the fragmina of the clavicle are in such cases generally little pronounced (in contrast to the typical great displacements in fractures of corpus claviculæ or, more rarely, of the sternal extremity), because the tractions of the muscles neutralise each other, and the strong connections of fragmina with ligamenta coraco-clavicularia counteract a greater displacement. The weight of the superior extremity may, however, produce a depression laterally of the acromial fragment, and it will easily be understood how the traction of musculus trapezius on the posterior margin and of musculus deltoideus on the anterior margin of the lateral fragmen will be able to twist it so that the superior surface and anterior margin is depressed laterally and at the same time turned somewhat forward, while the reverse is the case with the posterior edge. Such a fracture often runs obliquely laterally-medially from front to back. Sure traces of the line of fracture on the surface are absent. The preservation of the surface is insuffient. It must be added that as the individual was young, it may possibly have been an incomplete fracture as it is sometimes seen in young individuals. In this way, too, the deformation of a growing clavicle might have originated. In any case the probability will be great of an obliteration of the lines of fracture on the surface in a slight displacement of the fragmina in a young growing individual. The presence of the right clavicle, the right acromion and manubrium sterni permits us to form an estimate of the shoulder-breadth of the individual (= 24 cm.). For if the bones of the shoulder girdle and the manubrium sterni are put together, as done in the case of Herjolfsnes (Ikigait) II, in the position they must most probably have had intra vitam, we obtain the distance between the outer edges of the right and left acromion which is 2 × [9.5 cm. (= clavicula) + 1.3 cm. (= $^1/_2$ sternal breadth) + 1.3 cm. (= acromion) total = abt. 12] = abt. 24 cm. To this figure we must add a little for the soft parts, the skin, and subcutaneous tissue, over the subcutaneous region of acromion; see also remarks under case II. The shoulder breadth thus found is exceedingly modest, but as we emphasised elsewhere (see Ikigait XX), the muscular impressions on the skeleton of the arms and shoulders are comparatively well pronounced, and on the whole there are numerous signs that these small, slender women have had to exercise their muscles well.

Both humeri are present in a fairly good state of preservation, though extremitas inferior both of the right and left humerus has been broken off. But it is preserved in part so that the total length may be determined with tolerable certainty both for humeri and the right radius.

Table 14. Dimensions. Case XV.

Total length	Centimeters
Humerus dext.	abt. 28.3
Humerus sin.	abt. 28.2
Radius dext.	19.5

Like the bones of antibrachium both humeri are slender (see figures 101—102 in Tabula XXXIV). The epiphyses are fused proximally and distally, but the epiphysis line is still very clearly seen at the upper end of humeri.

Of the skeleton of antibrachium we find both radius and ulna on both sides, best preserved on the right side, especially radius. Ulnæ are narrow. The distal epiphyses on radius and ulna are as yet only slightly fused and have come loose both in ulna and radius.

Of the skeleton of the hand and carpus we find of the right hand: a very small os multangulum majus, further, metacarpal bones of the 1st, 2nd, and 3rd fingers; also the 1st and 2nd phalanges of the 1st, 2nd, 3rd and of the 4th finger. In the 3rd finger the 3rd phalanx is also present. All the bones are small. The epiphyses of the metacarpal bones are fused but visible.

Of the left hand and wrist we find os multangulum minus.

In this individual the skeleton of the upper arms is rather long, that of the forearm shorter; the hands are long but narrow for the age. We give the dimensions of some of the bones.

Table 15. Right Hand, Length of Bones. Case XV.

os metacarpale	phalanx I	phalanx II	phalanx III	total length
III 54 mm.	36 mm.	25 mm.	abt. 13(-15) mm.	128 mm.
II 53 mm.	34 mm.	25 mm.	12—13 mm. (presumably)	abt. 124 mm.
I 38 mm.	27 mm.			

The total length of the third finger and metacarpal bone may thus be determined and is in all for the third finger, the middle finger, abt. 13 cm., with an addition for the cartilages, a little more. For the 2nd finger, the index finger, we may, I think, assume that the distal III phalange (the nail phalange) has had about the same length as that of the third finger, we shall then get a somewhat shorter length viz. abt. 12.5 cm. for the index finger. If the metacarpal bones are not included, the length of the free phalanges (all 3 included) will be abt. 7.7 cm. for the third finger (including an addition for cartilage), abt. 7.3 cm. for the 2nd finger, which is in good agreement with what is usually found. The metacarpal bone of the thumb is somewhat smaller, but a little, not much, thicker than the others.

A picture of the right hand assembled is given in fig. 103 Tabula XXXV.

As will easily be seen it appears from the dimensions found that the individual, in spite of her slenderness and short stature, had a long narrow hand and comparatively long, thin fingers, which is in good agreement with the comparatively long arms.

The total length of the whole of the free superior extremity may thus be calculated and, including the bones of humerus, radius, carpus, and the hand (3rd finger) with an addition for cartilage, it will be abt. 64 cm.

As now the entire height of the body cannot be estimated at more than 138—140 cm., the skeleton of the arm is 46 p. c. of the entire height. The total length of the inferior extremity to the heel may in the same way be calculated to be abt. 70.6 cm. (see below), and including the soft parts under the heel, it will presumably be abt. 73 cm., the trochanter-length 8 mm. less. When the total height is estimated at 138—140 cm., and the length of the inferior extremity, the trochanter-height including the soft parts under the heel is abt. 72 cm., the height of the rest of the body, the trunk + neck and head, above trochanter major (abt. the centre of the hip-joints) the bi-trochanteric plane, will thus be abt. 66—68 cm., while the length of the arms with the addition of the soft parts on the finger tips will be over 64 cm!

The proportions of the individual in question will thus be as follows:

Table 16. Proportions of Individual XV.

Total height of the individual	abt. 138—140 cm.
Length of inferior extremity from heel to tip of trochanter major, trochanter-height	abt. 72 cm.
Length of head, neck, trunk above connecting line of hip-joints (apex of trochanter major)	abt. 66—68 cm.
Length of arm	abt. 64 cm.
Shoulder-breadth on skeleton	abt. 24 cm.
Breadth at hips between the outer surfaces of trochanter major dext. et sin.	abt. 25.5 cm.

To the shoulder-breadth and breadth at hips must further be made an addition for the thickness of the soft parts, such as skin and fat, though it can hardly have been much at any rate at the shoulders.

In proportion to the height of the body (individual) the length of the arms is as we said 46 p. c. (ideal 0.444:!) the length of the legs is 52 p. c. (ideal 0.555:1).

The ratio of the arms to the legs is here as (64 (= 4 × 16) : 72 (= 4.5 × 16)) = 4 : 4.5 (Ideal 4.44 : 5.55).

From these figures it will appear that the arms in proportion to the length of the leg are absolutely too long. This appears, too, from their proportion to the body height, where the arms are a little too long, while the legs are a little too short, but as the body height was calculated on the basis of these bones, there is nothing strange in this finding its expression here, while the relative proportion between the arms and legs was, as we saw, directly measured.

Of the skeleton of the **pelvis** we find os sacrum and os coxæ sin. Os sacrum has been split up in its four upper segments (the lowermost 5th segment is absent), moreover the corpora are posteriorly separated from the arcus region, and the lower segments are also partly separated from massæ laterales. The disci intervertebrales between corpora are present, the lateral epiphyses on massæ laterales have partly come loose.

The components may, however, be so far assembled that the breadth may be measured. It is at least abt. 10 cm. (including the epiphyses). The length of the four upper segments of the bone is abt. 7.5 cm. to which must be added abt. 11 mm. for the last missing segment, so that the total length must have been 8.6 cm. Index sacralis $\left(\frac{100 \times \text{the breadth}}{\text{the length}}\right)$ is thus 1.16. The bone has been rather flat with only slightly pronounced concavity, and on the whole it gives the impression of slenderness, corresponding to the rest.

The small and slender left os coxæ Fig. 93—96 Tabula XXXII) is partly preserved, but part of ramus horizontalis of os pubis is absent. The anterior upper part of crista ilii is broken off, but can be joined to the rest. The epiphyses are present, and in process of being fused with the bone, they are in part broken off on the anterior part of crista. The height of the bone may be measured, it is in maximum 17 cm. from tuber to crista. Of the left os pubis we find ramus descendens and the region at the symphysis pubis, (Tabula XXXII fig 95—96), corresponding in size to what might be expected from the rest of the pelvis. The character of symphysis pubis is female, likewise the shape of foramen obturatum, angulus infra pubem may be determined from the left half (measured from the sagittal plane) to be abt. 2 × (54°—56°) = 108°—112°, corresponding with the female sex. Altogether the bones of the pelvis show female characteritics. Acetabulum is to a great extent preserved on the left side. Os sacrum and the left os coxæ can be put together so that the distance

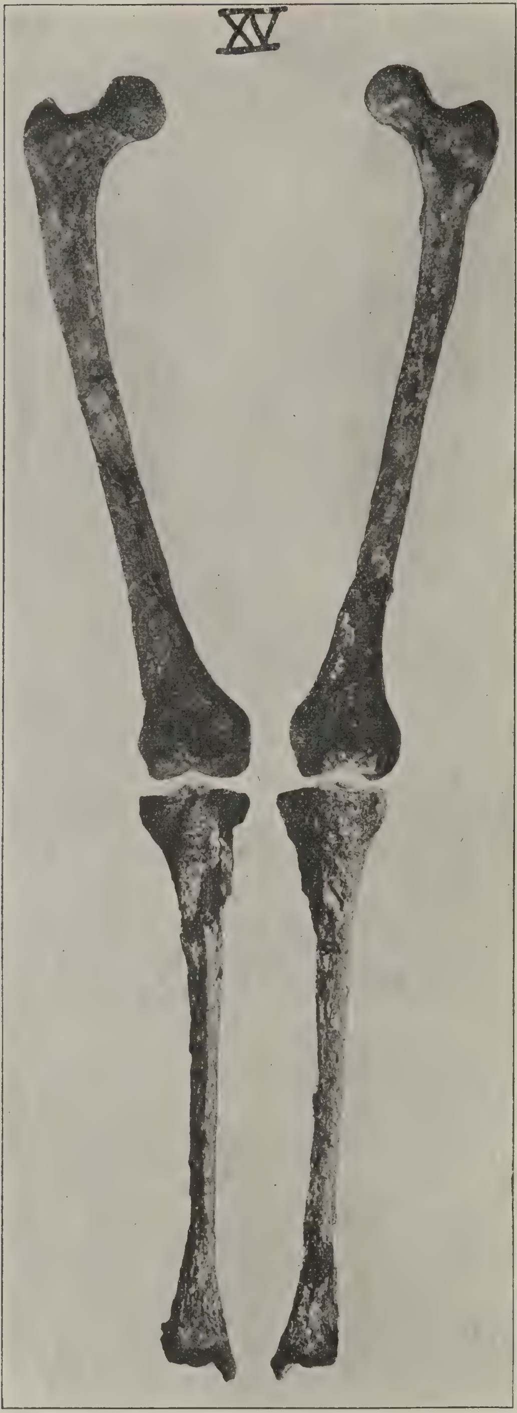

Fig. XVII. $^1/_4$ nat. Femur and tibia dext. and sin. (case XV). Distance between the hipjoints ab. 11 cm nat.

from the sagittal median plane through os sacrum to the bottom of the left acetabulum may be measured with sufficient approximation. It is found to be abt. 55—56 mm. On the supposition that there has been no great difference in size between the right and the left half of the assembled pelvis, the distance between the cartilage-coated surface in the bottom of acetabulum of the right and left side — and with this the transverse distance between the medial surfaces of caput femoris dext. and sin. may be estimated to be abt. 11 cm. The transverse diameter in cavum pelvis is thus not very large either. This result corresponds with the distance, found in another way, between the bottom of the right and left hip-joint by a reconstruction of the distance between the left and right capita femoris similar to that mentioned in Herjolfsnes (Ikigait) II (see **text-figure XVII** and fig. 98. Tabula XXXIII). From this, as well as from the size of the components of the pelvis, it will be seen that the pelvis has been small with little room, corresponding partly to the small size of the individual, partly to her slight build and young age, since she was hardly quite grown up yet. It is not, however, probable that she would have grown much more as she had already reached the age of 22—23 when she died.

The external breadth at the hips, i. e. the distance between the external surfaces of trochanter major in the right and left thigh bones, may be measured in the above-mentioned reconstruction ($^{1}/_{4}$ nat. size) (text-figure XVII) of the distance between the hip-joints and amounts to 25.5 cm. natural size, to which comes an addition (somewhat more variable in women) for the soft parts, especially the subcutaneous fatty tissue. But apart from this the direct measures show that the individual was narrow at the hips and had a small pelvis. Cp. also fig. 98. Tabula XXXIII.

Of the skeleton of the free inferior extremities both femora are found, also both patellæ and both tibiæ. Of the skeleton of the right foot we find: calcaneus, talus, os naviculare, os cuboideum, os cuneiforme I and II, and fragments of the metatarsal bones, especially the proximal half of os metatarsale of the I toe, hallux. Of the skeleton of the left foot we find calcaneus and talus. All the bones of the foot are very small, but in the main quite well preserved in shape and appearance. See pictures of **talus** and **calcaneus Tabulæ XXXV—XXXVIII** figures 104—113. Certain things, however, indicate that there has been a tendency to pes planus. Of special interest are the dimensions of the two large bones, calcaneus and talus, given in the table below:

Table 17. Case XV.

Dimension of		Calcaneus	Talus
Length	dext.	60 mm.	38 m.
	sin.	60 mm.	38 m.
Breadth (under sustentaculum tali)	dext.	21 mm.	
	sin.	20 mm.	

Table 18. Case XV.

The total vertical height of calcaneus + talus.			
Calcaneus + talus	dext.	51 mm.	exclusive of the thickness of the articular cartilages
	sin.	52 mm.	

The figures given in the table above are measured from the lower side of tuber calcanei to the surface of trochlea tali when the feet are in the natural position resting on a level substratum.

These figures are important in the calculation of the total length of the lower extremity and must be increased with the thickness of the cartilages as well as the thickness of the soft parts of the heel, i. e. with the skin and the large subcutaneous cushion of fat on the lower side of tuber calcanei on which the foot rests in the standing position.

A more detailed description of the bones of femur and crus is needed. Both the femora and tibiæ are slender bones. **The femora** are in best preservation apart from some peeling of the surfaces; they show some platymery. In an appreciably poorer state of preservation or quite broken are **the tibiæ** which show some platycnemy.

The left femur (see illustration fig. 1. Tabula I of femora placed close together) is appreciably thinner and feebler than the right femur which is thicker and more powerful. On the other hand the right femur is broken in two a little below the centre, but not otherwise than that the lower fragment may with sufficient certainty be placed in its proper position as it is done in the picture (text-figure XVII) of both femora in their natural position with the correct distance found above between the hip-joints. In the picture **fig. 98** of both femora in Tabula XXXIII the lower extremity of the right femur is placed a little too high up. In reality both femora have been of almost the same length, and by a <-> it is indicated that the two fragments of the right femur should be a little farther apart as the contours of the bones indicate. Outside the contours of the feebler left femur the contours of the upper and lower third of the stronger right femur have been sketched in. They are placed in the places where they naturally belong in relation to the contours of the left femur. It is thus seen that the caput femoris proper on the left side is a little smaller than on the right, while condyli femoris sin. is only a little smaller than the right one. On the other hand the difference is very pronounced at the upper border of collum femoris, at trochanter major, and still more laterally on a level with the insertion of musculus gluteus maximus, whereas the medial contours of the right and left femora are here almost coincident. The far greater size of the whole of the upper part of the right femur thus appears very plainly.

Similarly, though not quite so conspicuously, the middle part of corpus femoris and especially the lower extremity (exclusively of condyli femoris) of the left femur are considerably thinner than on the right side. The character and shape of extremitas superior in both femora agree very well. They have a small caput femoris, a short, low collum, and small trochanters. In its upper part the right femur gives one the impression of being somewhat amply convexly curved laterally[!]. Owing to the characteristic shape of caput and collum, which corresponds well with the shape of the other femora from this find, the angle between collum femoris and corpus gives one the impression of being smaller, more approaching to a right angle, than the real size of this angle proves to be when it is taken as the angle between the axes (the median lines) of collum and corpus femoris. Measured in this way like the others the collum-diaphysis angle will be:

Table 19. Case XV.

Collum-diaphysis angle	femur dext.	109°
	femur sin.	118°

In this difference is also expressed the above-mentioned convexity of the right femur. In the left femur the lengths may be measured with sufficient exactitude, while in the right femur they are uncertain even if it must probably be assumed that they were about the same as in the left femur.

Table 20. Dimensions of femur sin. Case XV.

Femur sin.	Total length	abt. 376 mm.
	Trochanter length	abt. 368 mm.

On the **height** see elsewhere. It was calculated to be at most 138—140 cm. (see chapter VII).

The surface relief of the bones was too much injured by chipping and the loosening of lamina externa for the muscular impressions to be analysed with any great result. It could be seen, however, that the muscles on the right side had been stronger than those on the left side. This was further expressed in the fact that the left facies patellaris femoris was the smallest, and even more conspicuously is seen the considerable difference in size between the well preserved smaller left **patella** in contrast to the considerably larger and stronger right patella, which, however, as the figures 97 and 100 in Tabula XXXII and XXXIII show, is somewhat chipped inferiorly, and laterally anteriorly. The cartilage still adhered to the posterior surface of the patellæ which turned towards the knee-jiont, though dried up and tanned. A similar great difference, where, however, the left patella was the largest, was seen in another individual from Herjolfsnes, case XX.

Tibiæ dext. and sin. were more injured, the superior and inferior extremities on both sides being partly broken off from the diaphysis; they could, however, be placed tolerably in position and be assembled (see fig. 99 on Tabula XXXIII), so that it could be seen with certainty that the left tibia had been just as long as the right one, the length of the right tibia being determinable.

Table 21.

Length of Tibia dext.	Between the upper and lower articular surface abt. 270 mm.
	Total malleolar length including spinæ 280 mm.

As pointed out above there was some platycnemy.

From the dimensions here given the total length of the lower extremities may then be determined with sufficient certainty.

Table 22. Proportions of the Left Inferior Extremity: Case XV.

Femur sin.	Total length 376 mm.	Trochanter length 368 mm.
Tibia dext. (sin.)	Length between the articular surfaces 270 mm.	
Height of Calcaneus + talus	52 mm.	
Total thickness of cartilage on all articular surfaces	abt. 8 mm.	
Sum total	70.6 cm.	
Thickness of soft parts on the heel to be added	abt. 2 cm.	
Total length of inferior extremity	72.6 cm.	

As regards the proportions of the body see p. 386 under the superior extremities and trunk, from which it appears (even apart from the calculation of the height) that the individual has had short legs, especially short tibiæ in proportion to the thighs, and the feet have been small and low. The arms, on the other hand, have been relatively very long, both the upper arms and the long narrow hands. Everything seems to indicate that the trunk has been short. The pelvis was small and narrow, the breadth across the shoulders and at the hip small, and the thorax correspondingly slight and narrow.

Everything thus shows that this young woman was a very small and slight individual, ill-proportioned, very backward in physical development and poorly equipped for resisting hard conditions of life or for carrying on the race — in short a sad **degenerated form** of the hardy and strong Icelandic races that colonised Greenland 900 years ago.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XVI.

A young individual, probably about 15—16 years. Probably a boy (The dress: a hood).

Only teeth were found, and of these only the enamel crowns, viz. an entire crown of an upper wisdom tooth and half the crown of another upper wisdom tooth, both not worn, also part of the slightly worn crown of the 2nd lower molar (not wisdom tooth).

From this we may conclude that the individual cannot have been very old. The 2nd lower molar being only a little worn, and the wisdom teeth (or at any rate their crowns) being present but not worn, the individual must have been of the age at which (even in individuals from this find) the 2nd molars are only as yet little worn after their eruption (the 1st molar would at that time have been much more worn down, as is seen in the other skeletons). The age may therefore be put at (14)—15—16—(17) years. According to Dr. Nörlund this agrees well with the dress, an ordinary hood for an adult, but very "smart", having a long "tail".

Herjolfsnes (Ikigait) 1921(-22). Skeleton XVII.

Adult individual not old (abt. 20—30 years), hardly very well-grown.

Among the remains of the vertebral column we note especially the left part of atlas, viz. massa lateralis sin. with processus transversus atlantis. It has been a small vertebra (see pictures 117—119 in $^3/_2$ nat. size, Tabula XXXIX) and shows that the corresponding condyli on occiput have also been small, this, then, indicates a small vertebral column and a not very large skull, which may also be directly observed from the remains of the latter.

Of the skull we find: os frontale, two ossa parietalia, squama occipitalis, two ossa temporalia and the mandible, which is broken in two pieces near the middle, but can easily be put together.

Os frontale is rather small, not broad and especially tapering downward with feeble arcus superciliares and small orbits, the lateral orbital border being sharp. There are well-marked tubera frontalia. The forehead has not been broad, its profile is first somewhat steep downwards, then somewhat receding upwards. The root of the nose is rather broad. Ossa parietalia are asymmetric and large, with large well-marked tuber parietale. Ossa temporalia are both present. They exhibit especially small processus mastoidei which should indicate a female skull. Ossa zygomatica cannot have been very prominent, compare the remains of them on the upper jaw.

In spite of the bad state of preservation, the skull could be put together in such a way that its outline and general appearance could in the main be ascertained. Hence in Tabula LXI—LXIII fig. 182—188 is given a series of illustrations of **the assembled skull.** It is small and shows unmistable similarity to the other skulls from Herjolfsnes (Ikigait). Viewed from before the narrow forehead tapering towards the orbital regions shows very distinctly, while it broadens upward and posteriorly. This is very characteristically shown in the two pictures of the skull seen from above, one more anteriorly so that the upper orbital border and the root of the nose are included, the other seen more in the vertical norma parietalis so that the strongly tapering forehead and the considerable width across the vertex appears very plainly.

The very conspicuous asymmetry between the right and left os parietale, which we see in the picture, is by no means due only to a postmortem deformation of the bones of the skull, but must certainly have been very pronounced in life, too. It is easily seen, amongst other things because the edges of the sutures are sufficiently preserved in the decisive areas, that the right os parietale is longer and larger, and that tuber parietale lies farther backward, while the left os parietale is somewhat smaller and tuber parietale lies farther forward and is more prominent. The asymmetry also appears, though in less degree, on the right side of os frontale. Only pars squamosa was preserved of os occipitale. The posterior aspect of the skull also shows the peculiar broad form very plainly. The pictures of the skull seen from the right and left are very instructive (norma temporalis dext. et sin.). For the dimensions see the tables of all the skulls p. 427 and 429.

It will further be seen how the outline of the forehead first rises rather steeply, then curves somewhat upward and backward with a more regular arch, then again passes into a rather flat arch. This latter lies above the posterior one-fourth of os frontale and the anterior two-thirds of ossa parietalia, after which comes a very distinct change in the contour which descends rather steeply towards lambda. Viewed from the left the uninjured passage from os parietale to the upper part of lambda appears very plainly, after which the contour bends rapidly downward.

It is very plainly seen on the right side of the skull both on os frontis, os parietale, os occipitale, and in the specially figured right os temporale (pars mastoidea e. g.) that there are considerable remains of cloth adhering direct to the skull fig. 182—188 (Tabulæ LXI—LXIII). This cloth is made of the fibres of plants (hemp?) and is of the same coarse texture as that found on several other skeletal remains (thus very plain in the thoracic vertebræ and the sternum from case X —see pictures). A hood being found outside round the head, we here find fresh corroboration of the information gained before from the skeletal remains, that besides skin, coarse linen of plant bast fibres (mostly hemp as the microscopic examination showed) was worn under the woollen dresses, which information could not be gained from the dresses alone. In the present case this plant substance cloth must be regarded as part of the clothing of the body, perhaps as a kind of shroud. See also the pictures of ossa temporalia. (Fig. 114 in Tabula XXXIX and fig. 186 in Tabula LXII).

The jaws are short, rather narrow, the impressions of the muscles of mastication are not strong. The jaws have probably been small, short, powerful jaws with a comparatively large processus alveolaris (especially the lower jaw) and rather large, very much worn teeth, especially the incisors, the canines, the premolars, and the 1st molar. In these teeth, and in the 2nd molar, the dentine is considerable worn down. The wisdom teeth are only little worn or not at all. Especially the teeth of the left lower jaw are very much worn down.

Pictures of **teeth and jaws** are found on **Tabula LXXV—LXXVIII** fig. 223—236.

Of ossa maxillæ the right bone is best preserved having part of arcus zygomaticus left. The incisors have fallen out, but the canine is preserved besides 2 premolars and the 1st and 2nd molars. The wisdom tooth has fallen out, the alveolus shows that it must have been small. Of the left os maxillæ processus alveolaris is preserved and the adjoining part of corpus, also 2 premolars and the 1st and 2nd molars. The wisdom tooth has fallen out, it was not large, though not so small as on the right side. The preserved teeth are well-developed, rather powerful, but very much worn down, we note especially the great wear in the premolars and the canine, and in the 1st molar. The teeth of the left side especially are much worn (cp. the lower jaw) on the oral side as is only natural, barely one-third of the crown being left. It is a well-known fact that, in the premolars and the molars in the upper jaw, the cusps are especially worn down on the oral side, while in the lower jaw it is the cusps on the buccal side that are especially worn. Later on the wear is extended to the other cusps, too.

The lower jaw is short and rather powerful, somewhat narrow and with slightly prominent chin. On the right side ramus has been damaged, also some of angulus, on the left side the upper part of ramus is entirely absent. It is worth noting that opposite the left 1st and 2nd premolars and the 1st molar on the inner side of corpus mandibulæ there is a thickened smooth deposit of bone, corresponding to a torus mandibularis;¹) on the right side something similar is found though less pronounced. It must in my opinion be understood as a functional

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¹) Cp. C. M. Fürst and Fr. C. C. Hansen, Crania Groenlandica. Fol. Copenhagen 1915. p. 178 f. p.

strengthening opposite these teeth which during the growth of the jaw for a number of years, viz. from the age of 6 until the 2nd molar came into use (12—13 years), have been used much more than ordinarily, as the enormous wear on the teeth shows, especially on the left side. As is very finely shown in the pictures, especially the 1st molar has been subjected to very intensive wear during 6 or 7 years (fig. 223—227 and 228—236) before the second molar erupted and could take part in mastication. On the left side the 1st molar is practically worn right down to collum dentis or below, thus posteriorly and orally almost right down to the roots. As a result the pulp cavity has long since been filled with secondary dentine, and this has again been worn down. Especially buccally the roots of the 1st molar are almost quite denuded, somewhat less orally. But also the anterior root of the 2nd molar in the lower jaw is in part too much denuded buccally. This points to a state of irritation in the tissue round the tooth and resorption of processus alveolaris as a result. As the main cause we must in the first place think of the excessive wear with overexertion and irritation of the tissue, combined at last probably with some inflammation (perhaps also some pyorrhea alveolaris?). Signs of similar processes are found round the roots of the premolars and the canine, but feebler and with a commencing resorption of the border of processus alveolaris. The posterior root of the 2nd molar and the wisdom tooth which is only slightly worn anteriorly are not, however, affected.

In the right half of the lower jaw there is also strong wear of the teeth, though not so much as of the same teeth in the left side. The wisdom tooth was present, but has fallen out, see figures, and the alveolus shows that it has been small with two small roots. The wear in the canine and the premolars is very considerable (also in the incisors) though somewhat less than on the left side. This is the case, too, with the 2nd molar.

The explanation hereof is afforded by the circumstance that here, round the 1st molar, there has exceptionally been a chronic inflammation with the formation of a fistula up the side of collum dentis. The tooth itself has remained in the alveolus (after death it has, it is true, disappeareds, but the alveolus is still there) and as it has been sore, or at any rate less capable of function, the individual has been obliged to use the molars of the left side more intensively during the last time before her death. If we compare the wear on the teeth of the upper jaw herewith we see, too, that the wear on the 2nd premolar and the 1st molar in the upper jaw on the right side is considerable, but less than on the left side — i. e. just on those teeth that work with the 1st molar in the lower jaw on the right side, but it is not impossible that the individual may have been able to masticate to some extent with the incisors, the canine and 1st premolar on the right side (cp. also chapter X on the teeth and the food). The time of eruption for the permanent teeth is as follows: the 1st molars in the upper and lower jaws appear (are "cut") abt. the age of 6, the 1st incisor at the age of 7, the 2nd incisor at 8, the 1st premolar at 9, the 2nd premolar at 10, the canine at 11, the 2nd molar at 12(13) and the wisdom tooth between the age of (16)17—21 or later.

The wear on the preserved wisdom teeth is comparatively little or none. On the 2nd molar there is some wear, but nothing to speak of in comparison with that on the 1st molar and the other teeth, which together with the 1st molar do the work of mastication proper until the 12th year when the 2nd molar appears (is "cut"). This is here seen especially on the left side. This means then that the individual Herjolfsnes (Ikigait) XVII has had excessive wear on his teeth already during childhood from the 6th to the 12th or 13th year, which again shows that the food must have been excessively wearing to the teeth, most probably poor and bad, demanding excessive mastication just during these years (Cp. the torus mandibularis development).

The age of the individual cannot have been high, abt. 20—30 years. (Cp. the skull, the slight wear of the wisdom tooth in the left side of the mandible se also Case XVIII). The findings in the teeth seem to show that in his childhood from the 6th to the 13th year and somewhat longer the individual lived during a period when there were often years of scarcity, when there was great scarcity of food, when a bad, hard and very wearing vegetable diet mixed with sand from the hand millstones or originally containing hard fine mineral dust had to be used, and perhaps other tough food, bark meal, "makeshift bread" of various sorts, etc.¹) For there is hardly any other explanation of this absolutely and comparatively great wear just of the 1st molar and those teeth that immediately succed it when the permanent teeth appear. Similar conditions are found in several other sets of teeth in individuals from the Herjolfsnes (Ikigait)-finds. Common to them all is the comparatively great wear of the teeth, especially the abovementioned, during youth.

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¹) During the "great war" and after, some of the old "makeshift" or "emergency" bread came into use again during the hunger blockade, with grass, leaves bark etc to eke out the flour (Brotstreckung), both in Sweden and Finland. As regards the eating of skin during famines Eskimo tales recount how dog's harness and skin clothing may be used in this way, because they are not properly tanned but only shamoyed with fat. They may, after cooking, perhaps fill the stomach for a while. We are reminded of Mylius-Erichsen's tale of the Greenlander who boiled his old skin trousers. (Si non e vero —!).

I of course know of analogues to relatively great wear on the teeth from other skulls, especially from early times, but I do not remember having seen it to such a degree in so young individuals before.

As stated above the skeleton was found in a hood. According to information received from Dr. Nörlund, it must most certainly have been a man's hood. On the other hand the whole skeleton absolutely points more in the direction of a woman. If the dress were a decisive factor, which is probably not the case, this might mean that we had perhaps to do with a male individual, in whom, however, the male type of skeleton for some reason or other was not developed or was repressed. As there was otherwise on the whole in the other cases excellent correspondence between the determination of the sex by the dress and by the quite independent results of the anatomical examination, our thoughts are directed towards two possibilities which merit mention. Either the individuals were not always buried in their own dress, or we have perhaps before us in this case the skeleton of a pseudo-hermaphrodite, e. g. a woman with partly male external sexual characters, who had then worn male clothing, or an individual in whom the male sexual glands (testicles) are put out of action either by disease or by a check in development e. g. kryptorchism or otherwise at an early age, so that the male type did not appear plainly in the skeleton.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XVIII.

Almost adult male, hardly well-grown, aged 22—25. The dress was male (hood) very narrow at the neck (cp. the narrow skull).

The skeletal remains consist chiefly of the skull, quite ruptured at the sutures which were all open except synchondrosis sphenobasilaris which had evidently been somewhat occlosed for a short time but was now found loosened again. Only very little was left of the facial bones with the exception of the lower jaw. Os frontis, 2 ossa parietalia, os occipitale, 2 ossa temporalia were, however, found; also alæ magnæ ossis sphenoidei with processus pterygoideus (adhering to ossa temporalia); the posterior part of corpus ossis sphenoidei is present; the upper jaw is absent with the palatal bone, the nasal skeleton, and os ethmoideum, ossa zygomatica, and part of the roof of orbitæ.

The skull is rather small and could subsequently be assembled. Os frontale shows that the frontal region is very narrow. From this and from the preserved lower jaw we may conclude that the face was rather narrow, especially the upper part, but with a comparatively powerful dental arch in the upper jaw and powerful processus frontales ossis maxillæ. By comparison with a very similar cranium Herjolfsnes II and partly Ikigait 343 the position of the lower jaw and the height of the upper face may with a certain probability be determined, as shown by the subsequently assembled cranium Herjolfsnes (Ikigait) XVIII, **Tabula LXIV—LXVI,** fig. 189—195.

The orbits have been small with an only little projecting external upper orbital border, the root of the nose has been rather broad, there are small arcus superciliares. The forehead is low, ascending rather steeply a little way and then receding more evenly after a sligt projection, feebly marked tubera frontalia. The frontal region is on the whole rather small compared with the size of the parietal region. Seen from above in norma parietalis the frontal region is strikingly narrow with a slight parabolic curve which is continued, diverging evenly towards ossa parietalia to tubera parietalia, after which follows a shorter more converging curve to the narrow rounded occipital region. Ossa parietalia are large and arched with strongly projecting tubera and somewhat elongated angulus sphenoidalis. The broadest part of the skull is about at tubera parietalia, the right os parietale is somewhat larger and more strongly arched than the left, as may be seen plainly both in norma parietalis and in norma occipitalis which is markedly pentagonal with a rather low parietal region and rather long, almost vertical or slightly curved lateral regions in which also the asymmetry consequent upon the greater development of the right side appears very plainly. As seen i norma temporalis the occipital region does not, however, project with a special set-off as a tuber occipitale, the transition to the parietal region is quite even. Most of the squama occipitalis was preserved, also pars basilaris and partes laterales.

Ossa temporalia are large and powerful, especially the large very much downward projecting processus mastoidei. There is a large fossa for musculus digastricus, — corresponding to the relatively powerful lower jaw. The ear-openings are large and wide. Fossa mandibularis is not very deep. Processus zygomatici are somewhat feeble compared with the rest and do not project much, while we must suppose from the relative size of the dental arch of the lower jaw and deducing from it that of the upper jaw and its probable narrowness (cp. the shape of the forehead) that ossa zygomatica also have not been very prominent, all in accordance with the whole character of the skull. The surface from which musculus temporalis rises is not very large.

The mandible is present in almost uninjured state, being only broken into two halves, the line of fraction passing to the right of the median plane through the alveolus of the lateral incisor but to the right of the root of the tooth.

After several cautious attempts the jaw was at last assembled so that the natural shape appears very plainly as seen in the figures (**Tabula LXXIX—LXXX** fig. 237—243) of the lower jaw seen from above, one a little more from before (fig. 237) so that the front of the mental region and protuberans mentalis are seen, the other a little more from behind (fig. 238), so that the back of the mental area and spina mentalis interna are seen. The dental rows are very regular except that the right side diverges a little more posteriorly than the left, while the wisdom teeth show a tendency to go a little more laterally than molar II. Seen from above the jaw is somewhat short and rather narrow, rounded anteriorly with a slightly prominent mental area in the middle, the right half diverging a little more than the left. The jaw is not large, its appearance indicates a young individual of the age mentioned above. Basis is fairly powerful, ramus rather short and broad and the angle of the jaw a little more rounded on the right than on the left side. Processus condyloideus has a low collum but the condyle itself is well developed, but a little larger on the left side. There is a slight asymmetry posteriorly, the transverse axis of condylus dext. forms an angle of 84° with the sagittal plane, while the same angle formed by condylus sin. is 79°.

The axes of the condyles on the right and left sides cut each other in an angle of 163° posteriorly. The angle between corpus and ramus mandibulæ is abt. 114° on the right side, 113° on the left.

Table 23. Dimensions of the mandible. Case XVIII.

The height of ramus parallel with the posterior border is:	dext.	sin.
for processus condyloideus	52 mm.	51 mm.
for processus coronoideus	56 mm.	56 mm.
The breadth of ramus	34 mm.	34 mm.
The total distance from condylus to protuberans mentalis	105 mm.	112 mm.
Length of corpus from protuberans to angulus	84 mm.	85 mm.

Mento-alveolar height is	27 mm.
The bi-condylar breadth (between the external surfaces of the condyles) is	abt. 87 mm.
The bi-angular breadth is	82 mm.

Foramen mandibulare lies in the middle of ramus, and on the left side on a level with the alveolar border, on the right side a little above the alveolar border.

Foramen mentale lies opposite the interval between premolars I and II.

The distance of foramen mentale from the alveolar border is:
on the left side abt. 16 mm.
on the right side abt. 15 mm.

The distance of foramen mentale from basis mandibulæ is:
on the left side 10 mm.
on the right side 11 mm.

The total height of the lower jaw at foramen mentale is on both sides 26 mm.

There is a well-marked linea obliqua on the lateral facies. Masseter's insertion at the angle is not very pronounced. The right processus coronoideus is a little broader, the left a little more pointed, and the right processus condyloideus is a little lower than the left. The asymmetry consisting in a greater development of the right side than the left which was plainly seen in the skull, appears again in the lower jaw.

The **teeth** have all been present and are on the whole fairly powerful, only the left premolar has fallen out. The enamel is extremely brittle and comes off easily, for instance in the left molar I in which the crown has therefore been whitened in the places where the enamel has come off (not been worn off) (See also the external surfaces of the right molar I and premolar II). The teeth are all well-developed, only the left wisdom tooth is very small and not worn at all, while the right one is only a little worn on its bucco-mesial cusp. It can hardly have been long erupted or else it would at any rate be more worn on its right side. Perhaps the wisdom teeth in the upper jaw have not been erupted or not in contact. Incisors, canines and premolars are already very much worn down, so that the dentine has become exposed to a considerable extent (the black fissures in the dentine are due to the fact that it is largely decalcified and shrunken or decomposed, so that an opening to the pulp cavity has been formed).

As regards the wear on the teeth the reader is referred to the more detailed remarks on this subject under case XVII and to chapter X. In accordance herewith we find, as in a series of other jaws from the Herjolfsnes Ikigait find, special wear on the 6 years' molar (molar I) which bears the main burden of mastication during a longer period than the rest of the teeth. The wear is very plainly seen on the right side (the large figure 239 in $^1/_1$ size) where the cusps, both the buccal and the oral row, have entirely disappeared and the dentine become deeply eroded, while a ridge of enamel still remains opposite the fissure between the cusps, chiefly on the oral side. On the left side the same phenomenon is seen though hardly as plainly, since the enamel on both sides of the crown has come off. The amount of wear in proportion to the height of the crown is seen well in the figures of the lateral aspects of the jaw buccally and orally (fig. 240—243). The 2nd molar is somewhat less worn, but on this, too, the cusps are practically almost quite worn away, but the dentine is not worn down so low. It appears from this that this individual, too, had to masticate food that wore down the teeth a great deal both during childhood and youth, and considering the age indicated both by the sutures of the skull and the appearance of the lower jaw, the amount of wear must be denoted as extraordinary though in good accordance with what has otherwise been found among the Norsemen of Herjolfsnes (Ikigait) in this excavation.

Of the vertebral column only a few remnants are left, thus the first cervical vertebra, atlas. It is not large and, corresponding with the skull, shows a certain asymmetry: massa lateralis sinistra is smaller than dextra, and the same is the case with its lowermost articular surfaces for the 2nd cervical vertebra, epistropheus.

Further, it merits mention that of the skeleton of the right foot, a well-preserved os cuneiforme I was found. It was fairly large with a well-marked facet for musculus tibialis anticus. Further the much eroded medial part of a sagittally cut os calcaneum dext. with sustentacalum tali was preserved.

These finds show that the individual in question was a youngish man with a small head, small vertebral column with at any rate some asymmetry in its upper part. The lower extremeties and their muscles, at any rate the muscles of the foot and crus, have been fairly powerfully developed.

Herjolfsnes (Ikiğait) 1921(-22). Skeleton XIX.

Age 25—30 years. Probably a woman. Rather slightly built and with some scoliosis. Height abt. 144 cm.

Of the vertebral column some corpora vertebrarum are found, not very large. The epiphyses are not fused everywhere. There has been some scoliosis of the vertebral column, see for instance the dorsal vertebra with pronounced asymmetry shown in the illustration text-fig. XVIII and Tabula LII, fig. 160. The figure also shows the corpus of one of the lower lumbar vertebræ which is markedly cuneiform with compression of the left side. Of os sacrum the three lower segments are present and a chipped vertebra coccygea I. The synostosis between the sacral vertebræ is not yet quite complete, the portion found shows the sacral segments partly separated from each other.

Of the sternum the greater part of manubrium sterni is found, it is rather slender with small facets for claviculæ and for the first costa. Corpus sterni is narrow and almost entire only broken in two on a level with the fourth costal cartilage. In the lower part is found an oblong perforation. The sternum is asymmetrical, the lower part deviating somewhat to the right, as seen in the text-figure XVIII. The corresponding

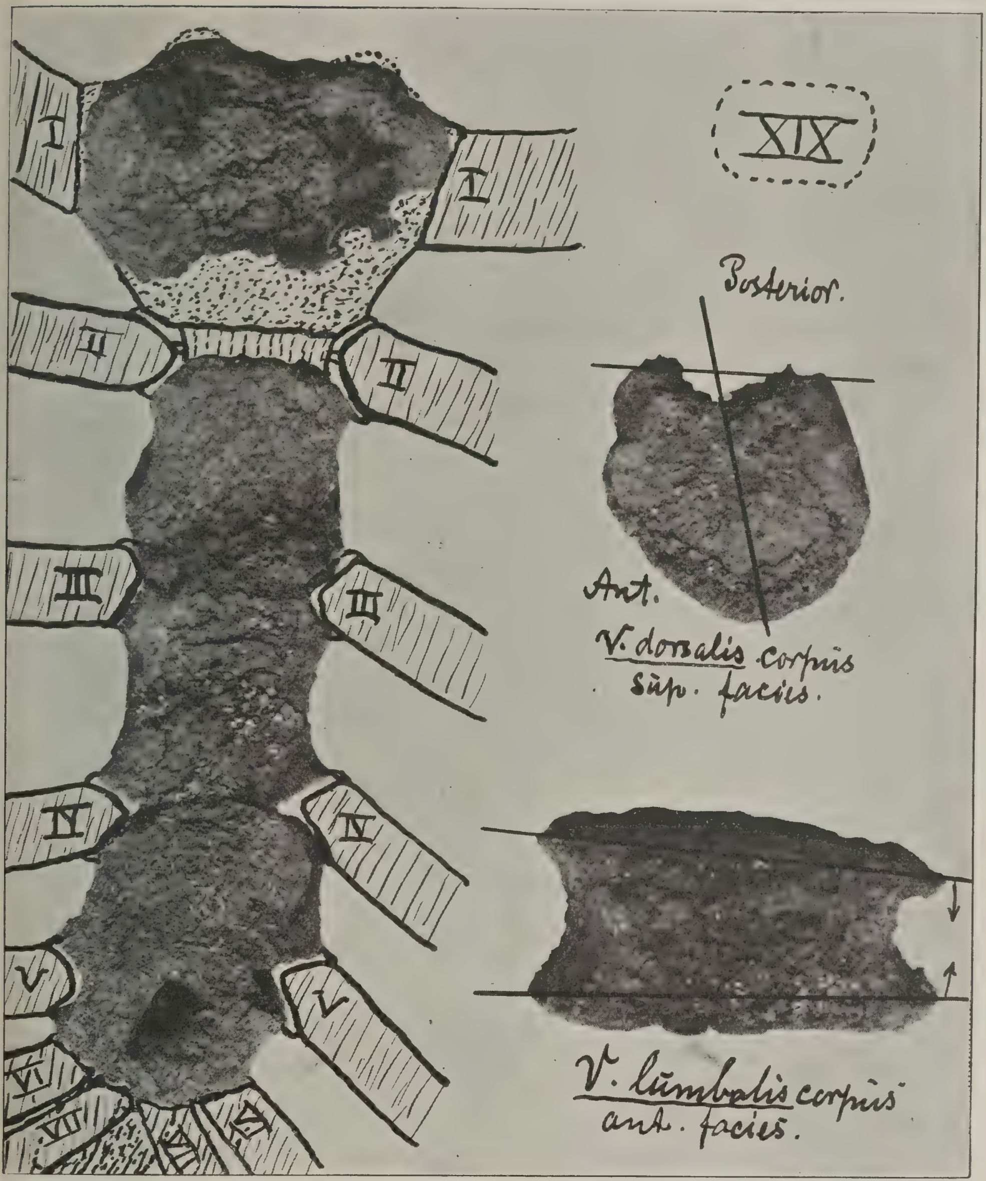

Fig. XVIII. abt. 1,05 nat. size. Sternum and costal cartilages reconstructed (scoliosis), ant. aspect. Two scoliotic deformed corpora vertebr. (Case XIX).

asymmetry of the skeleton of the thorax answers to the finding in the vertebræ.

Little remains of the superior extremities. Only the lower part of the left radius is present and the corresponding portion of the right radius. A few postmortally quite deformed carpal bones are present, and other small remnants, showing that the skeleton of the superior extremities has been rather small and slightly built.

Of the pelvis remains of the hip-bones are present. Both femora are present, too, but with trochanter major broken off. The right caput is defective. From the left femur, the caput of which is entire only broken off in collum, and which fits the rest of the bone exactly, the total length of femur sin. may be measured to be 396 mm.

The whole character of the skeleton points in the direction of a woman. The **height**, stature, is calculated to be abt. 146.5 cm. or possibly 144 cm. (or somewhat less) owing to the scoliosis.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XX.

Adult individual, judging by the skeleton probably a woman. The dress tells us nothing certain. The age is nearer to 25 than 30. The height was at most 145 cm., perhaps somewhat less. A somewhat slender individual with cubitus valgus on both elbow-joints and symptoms of rhachitis in a slighter degree. The right thigh and knee are not a little feebler than the left. The various parts of the skeleton are partly much decalcified and tanned by acid humous substances, here and there penetrated by plant roots. Parts of the bones have, however, retained their shape and size very well, but are in part very brittle and break easily during examination. The bones are on the whole not large. Se **Tabula XL—LI** (figures 120—159) and **Tabula LXVII,** fig. 198, and **Tabula LXXXI—LXXXIV,** figures 244—255.

Of the vertebral column fragments of the vertebræ are present, both of corpora and arcus. The epiphyses are just fused. In part well preserved are atlas and some of epistropheus, viz. corpus, dens epistrophei and the left processus transv. Figures 120—123 (Tabula XL) of these — fairly normal types — are shown for comparison with the more deviating upper cervical vertebræ from cases X and XVII.

Os sacrum is for the most part present, part of the first sacral segment is, however, missing. The segments have partly become separated from each other, and the 1st vertebra coccygea is still loose on the lower apex of os sacrum. Os sacrum is somewhat flattened, compressed anteriorly—posteriorly. Of ossa coxæ the left is fairly well preserved with the exception of os pubis (see illustration 159, in Tabula LI). The height measured from crista iliaca to tuber ischii is in maximum 19 cm. The right os coxæ is found in fragments. The bones of the pelvis are on the whole rather small. The pelvis cannot be put together, but the shape of the bones indicates with certainty a female pelvis.

Of the skeleton of the thorax we find some much decalcified and very fragmentary ribs which have been rather small and slender. The main part of the deformation no doubt occurred during excavation and transport. A small costa I dextra is fairly well preserved, it is shown in natural size in Tabula XLII, fig. 128. Of the sternum we find manubrium and corpus fig. 129—131, Tabula XLII. On the posterior surface of manubrium we find corpora of two of the upper thoracic vertebræ adhering, so that part of the upper one (probably the 3rd vertebra thoracalis) projects a little above the upper edge of manubrium, while the lower end of the posterior surface of the latter is free. Corpora of the two adhering vertebræ show a fairly uninjured posterior surface with foramina for venæ basivertebrales. Arcus has been broken off. The whole of sternum gives one the impression of being comparatively little displaced, apart from the sinking posteriorly. Also on the upper part of the posterior surface of corpus sterni remains are seen of the spongiosa of corpus vertebræ adhering to the sternum. The anterior surfaces both of manubrium and corpus sterni are well preserved, the edges of the bones likewise in part. On the anterior surface of manubrium are seen some impressions of remnants of cloth. The articular surfaces of the clavicles have been small. Also the first costal cartilages have been rather thin anteriorly—posteriorly, but rather broad. The manubrium itself is narrow and flat without pronounced muscular impressions. A slight scoliosis of the entire sternum also seems to have been present. The notches for the costal cartilages are comparatively large. The type of the sternum calls to mind other sterna from the same locality. The length of manubrium is abt. 47 mm. of corpus abt. 74 mm., the total is thus 121 mm., apart from processus xiphoideus and synchondrosis sternalis. The (greatest) breadth of manubrium is abt. 40 mm., of corpus abt. 28 mm. As we observed above, the bones are thin and flat, but rather lengthy.

Of the shoulder girdle we find claviculæ and scapulæ.

Of the free skeleton of the superior extremities humeri and in part the bones of antibrachium are present. They are small bones but with fairly pronounced muscular impressions.

The clavicles are small and slender. The right one is fairly well preserved, the left one in less good preservation. It is best in the acromial part. After careful wetting with water the bone could be tolerably straightened so that its character appeared. The figures in Tabula XLIV fig. 135—136 show both clavicles seen from above and below. They show sufficiently the relatively broad and clumsy form of the clavicular end which is especially observed in the left clavicle seen from below. There are also well marked impressions of the ligaments.

Like the left clavicle the left scapula is also tolerably well preserved in shape in contrast to the right scapula which is much injured, though it could be put together, so that the shape could in the main be recognised. It appeared that the left and right scapulæ showed the same type. In order to avoid superfluous description we give figures in Tabula XLIII fig. 132—134 of the left scapula seen from behind and before, and of the right scapula seen from behind. The comparative slenderness of the bones is very evident. It is also clearly visible that (as in humeri) the muscular impressions have been rather pronounced, so that the individual must have used her muscles much. The strong impressions from m. trapezius and m. teres major should especially be noted.

The scapulæ, especially the right one, also show very clearly how the epiphysis lines along margo vertebralis and anguli, especially angulus inferior, have only become fused with the rest of the bone quite recently, or that these epiphyses have in part become loosened from the cartilages and fallen off. A somewhat magnified picture is given in Tabula XLIV fig. 137 of angulus inferior on the right scapula seen from behind, and in Tabula XLIV fig. 138, of the left scapula's cavitas glenoidalis with acromion, the epiphysis of which was preserved but loosened from acromion. The figures show the surface of acromion where the epiphysial layer of cartilage has been, while the osseous epiphysis has been removed. Processus coracoideus had been broken off. Cavitas glenoidalis is likewise seen. In natural size it measured 33 mm. in length.

As we said above, both humeri were present. The upper extremity of them with caput humeri was loose a little below collum chirurgicum. They could, however, be tolerably well put together so that we get a distinct idea of their habitus and approximate length. Quite exactly the length could not be acsertained, however. As said already, they are small and slender bones with rather small articular surfaces for the shoulder joint, but the tuberosities and muscular impressions are comparatively well developed (especially for m. deltoideus). The whole of the lower two-thirds of corpus humeri and especially extremitas inferior is extremely well preserved, and it is very striking how well developed are extremitas inferior with the articular surfaces for the elbow joint and the adjacent cristæ supracondyloideæ and the muscular impressions. The figures 139—140 in Tabula XLV of both humeri seen from before and behind shows this very plainly.

Detail pictures Tabula XLVI A, B and XLVII fig. 141—146 on a somewhat larger scale show the strong development especially of crista supracondyloidea lateralis and also the deep fossæ olecrani and fossæ coronoideæ of the ulna. On both articular surfaces on humeri for the bones of antibrachium it is seen how the otherwise normally present cartilage-coated crista and sulcus, separating trochlea humeri (with the articular surface for ulna) from capitulum humeri (with the articular surface for capitulum radii) are entirely absent on the left humerus and are only found as a feeble indication on the articular surface of the right humerus. This points absolutely to an abnormal form of articulation for the articular surfaces during the movements in the elbow-joints, and this is plainly confirmed by an examination of the bones of antibrachium. Fortunately both the right and left ulnæ (fig. 147) are well preserved in their upper part with the articular surfaces for humerus and radius, with processus coronoideus and processus olecrani and the upper third of corpus ulnæ. But the remaining part of the ulnæ is not well preserved. The left radius is tolerably well preserved in its upper extremity and fits well to humerus and ulna. The remaining portion of the left radius is injured. Only extremitas inferior radii sin. et dext. and the corresponding extremitas inferior of ulna sin. et dext. (with capitulum and processus styloideus) are so far preserved that it may be seen how the distal extremities of these bones are fairly powerful and broad, so that the wrist must have been rather broad and comparatively powerful (cp. fig. 148 in Tabula XLVII) which is further confirmed by a few carpal bones and finger bones. In proportion to her size the individual has had comparatively broad, clumsy, but probably rather short hands. A 1st phalanx was penetrated by a well preserved little plant root, while several other bones, too, such as os coxæ and femora and tibia, had plant roots grown into them.

If we place the right and left ulna on the articular surfaces of humerus, see **text-fig. XIX** the bones still fit excellently into the respective articulations, and almost symmetrically in the right and left articulatio cubiti there appears a pronounced deformity called **cubitus valgus** by which in this case the angle which the longitudinal axis of ulna (antibrachium) normally (upper part) forms with the frontal articular axis in humerus for flexion and extension in the elbow joint is considerably diminished. This, however, is not (right) or only slightly (left) the case with the angle which the longitudinal axis of humerus forms with the frontal axis for the flexion and extension movement in the elbow joint. It is quite precluded that this deformity of the articular surfaces of the elbow joint can be post-mortem or actually pathologic. Nor are there any symptoms of pathologic conditions in any of the joints, while the articular surfaces of humerus and ulna (and the preserved left capitulum radii) are quite sound and on the whole well preserved. The deformity on both sides is almost symmetrical on the right and the left ulna and may best be compared to an (inward) torsion of the upper extremity in relation to the normal, or it might be said that the remainder of the bone had been twisted outward in relation to the articular surface and the two processes supporting the articular surface. If we prolong the axis of the upper well preserved third part of ulna (the deformation (fig. 147) of which cannot be post mortem) till it cuts the frontal axis in the elbow joint shown in the text-figure, it is very distinctly seen how ulna and antibrachium in its entirety deviate laterally, so that the axis for antibrachium forms a much smaller angle than allowed by normal variation with the transverse axis in the elbow joint. Hence we have a pronounced cubitus valgus in which the outwardly open angle which the longitudinal axis of humerus and antibrachium form with one another, and which is normally abt. 160°—170°, has been reduced so much that as shown in text-figure XIX it is only abt. 141.5° on the left side, and abt. 145° on the right side.

The Tabula XLVII fig. 145—146 show pictures of the two components of the elbow joint assembled, (in addition to humeri dext. et sin. isolated), besides the left ulna from before. The pictures of both bones put together show that both ulnæ have almost symmetrical deviations from the normal shape.

The photos were taken with the bones joined in extended position and seen from before, while the thickness of the articular cartilage has been taken into account by interposing a corresponding layer of "plastiline". By making extension and flexion movements of ulna against humerus, it was easily ascertained how the altered position of ulna mentioned above has left traces also on the articular surfaces of humeri, for on the flexion movement forward in the elbow-joint the lateral edge of ulna's articular surface and part of this surface go more radially (laterally) than is normal, so that in the later phase of the flexion movement (with stronger flexion), it also touches some way on to the anterior surface of capitulum humeri and so passes the limit of its normal contact (with trochlea humeri). Hereby the extinction (absence) of the crista and sulcus, which in the normal movement of the elbow joint form the radial limit of ulna's articulation surface on humerus is explained. For the articular surface of humerus lying outside the sulcus in question corresponds to the articular surfaces of capitulum radii during movements in the elbow-joint. And it was the absence of these characteristic normal articular facets on the distal articular surfaces of humeri which first called our attention to the fact that there was something peculiar about the elbow-joints in this individual.

Before we go on to mention the functional conditions in the move-

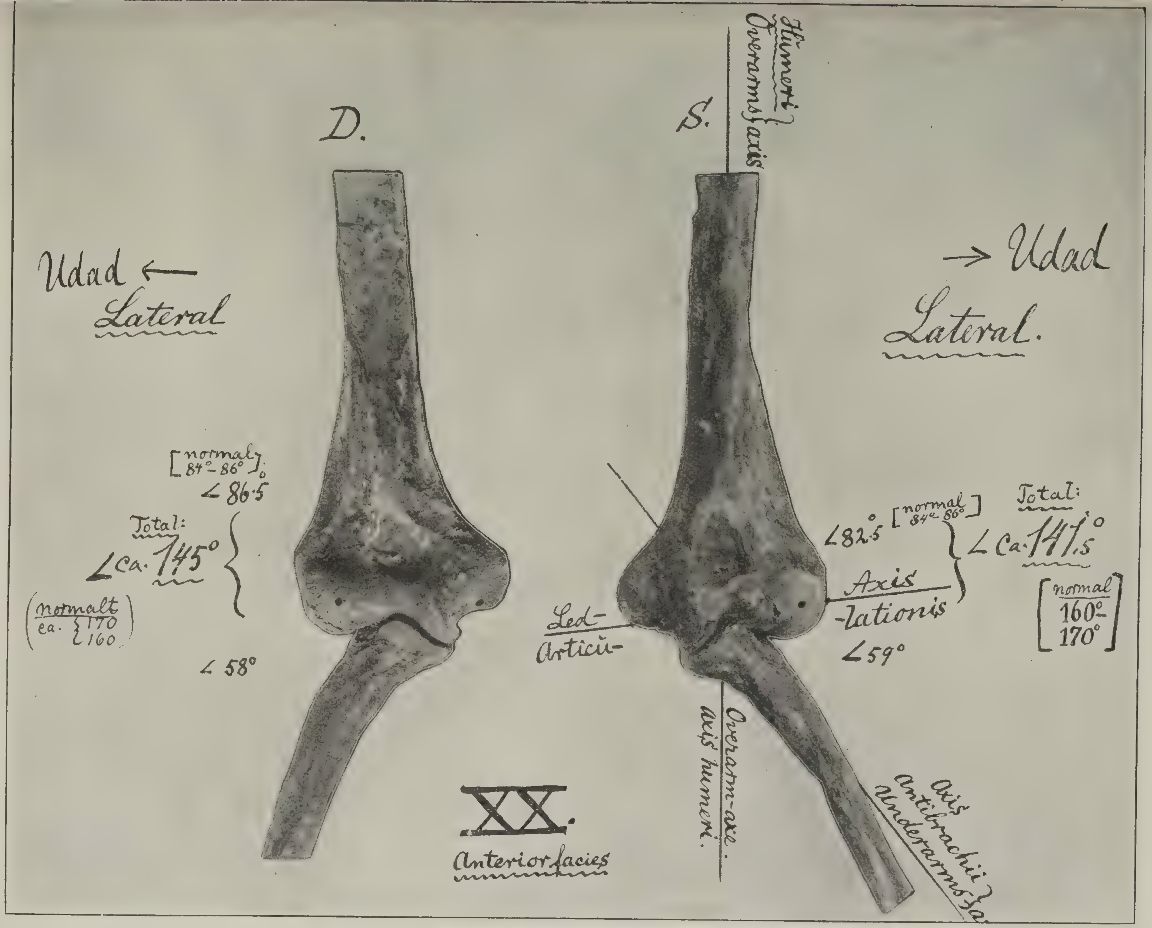

Fig. XIX. Herjolfsnes XX. Articulatio cubiti dext. et sin. axes in the articulations, in the humerus and in the ulna. Anterior aspect.

ments of the elbow-joints, we shall review **the text-figure XIX** in which the bones of both elbow-joints are represented with the axes for humerus and antibrachium (i. e. the proximal third part of ulna) indicated, and with the transversal axis for the flexion-extension movement in the elbow-joint. The usual position of the latter axis is supposed to be known, as well as the other anatomical facts.

The angle which the longitudinal axes of humerus and antibrachium normally form with each other is, as we said, a laterally open angle which may vary normally from abt. 170° to abt. 160°.

The angle is formed of two components, viz. 1) the angle which the longitudinal axis of humerus forms with the flexion-extension axis in the elbow-joint, and 2) the angle which the longitudinal axis of antibrachium (in this case ulna) forms with the said flexion-extension axis of the elbow-joint.

The superior component, the humeral angle (between the longitudinal axis of humerus and the frontal axis of the elbow-joint) is normally from abt. 84°—86°. The inferior component the ulnar angle (between the longitudinal axis of antibrachium and the frontal axis of the joint) lies between 74°—86°, hence it varies somewhat more, abt. 10—12°.

But if we examine the present case Herjolfsnes (Ikigait) XX, we obtain the following table:

Table 24. Herjolfsnes XX. Axes in the Elbow-joints.

Angles of axes	dext.	sin.	normal
Total humero-antibrachial angle = superior... + inferior .. components .	145°	141.5°	160°—170°
Superior cubital articular axis-humeral angle ...	86.5°	82.5°	84°—86°
Inferior cubital articular axis-ulnar angle	58°	59°	74°—86°

The rest will be evident from the illustration (text-figure XIX).

It appears, then, that the humero-antibrachial angle is so considerably reduced in both elbow-joints that it lies 28°—18° lower than, i. e. far below, the normal limits of variation, and the deviation at any rate lies abt. twice the normal amount of variation below its normal lower limit, especially on the left side, but it is very little less on the right side. It is further seen that the cubital articular axis-humeral angle on the right side is normal, and on the left side almost normal, lying only very little below the normal.

The greater part of the deviation lies in ulna (as could already be estimated anatomically by the deviation in shape), the cubital articular axis-ulnar angle being 58°—59°. From this then we may see that the cubitus valgus deformity in this case is due to the too great deviation of ulna and in consequence the whole of antibrachium laterally in relation to brachium. The form of the latter, on the other hand, has not been altered except just in the articular surface. These conditions further show that we are not dealing with an actually pathologic lateral deviation of the humerus (e. g. on a rhachitic basis of which we have symptoms in the lower extremity), but it must probably have been a constantly acting functional cause which has taken effect over long periods during the growth of this young, only just grown-up individual. It may for instance have been certain movements or forms of work involving strong muscular traction laterally during flexion and extension of the elbow-joint, by which the transformation of the articular surface will be explained as well as the wearing off of the normal relief on trochlea and capitulum humeri, without the loss of the cartilage which is abundantly present at that early age when the deformation or rather transformation of the articular relief occurred.

We have already called attention to certain conspicuously strong muscular impressions on the bones of the shoulder and superior extremity of this otherwise rather slender individual. Especially striking is the strong development of cristæ supracondyloideæ humeri particularly the lateral one on both sides, though most striking on the left side because the left humerus is otherwise normally a little more slender than the right humerus. We have thus quite undoubted signs that just the muscles with offspring from crista supracondyloidea lateralis must constantly have been used excessively, viz. above all musculus brachioradialis, but also musculus extensor carpi radialis longus (and brevis) and in addition of course the other muscles which move the elbow-joint.

By such unusually strong and frequently repeated muscular traction outward laterally on ulna or antibrachium during growth of the individual of the muscles of the radialis group amongst others, during the alternate extension and flexion in the elbow-joint, and pronation and supination during the movements of the hands, the appearance of the pronounced almost symmetrical cubitus valgus in the right and left elbow-joints must be explained. As now there are other symptoms of a slight rhachitic condition, for instance in the inferior extremities of this individual, we are perhaps not unjustified in assuming that a slightly rhachitic condition may have predisposed the individual to the above-described transformation of the elbow-joint produced by special functional causes, though this rachitic state has not otherwise shown itself by pronounced and typical rhachitic deformation of the bones of the superior extremity. This is all the more probable since we do not meet with any very pronounced deformity of the femora, for instance a strong genu valgum or genu varum, in this individual. And yet a rhachitis would in all probability be more likely to show itself in more pronounced deformities just of the inferior extremities (where the symptoms of rhachitis are in case XX certainly found to some extent but not very pronounced) than in the superior extremities and, as in this case, in the elbows. Some special cause, some work, domestic or otherwise, which this individual constantly performed and which required such movements of the arms as the traces left on the brachial bones indicate, must thus have been present. Among various sorts of domestic work in the old Norse colonies and elsewhere, **spinning** by means of a distaff will most naturally suggest itself to us as a specially female occupation which, according to what Professor Finnur Jónsson upon my inquiry informed me, required movements of the arms by which they are carried far to the side or lifted during alternate flexion and extension. This also corresponds well with the strong impressions on scapula of musculus trapezius and of musculus teres major, also of musculus deltoideus on the upper arm. It is quite conceivable that we have here the predisposing functional cause, acting for years, of the deformity found in the elbows, especially when there has been a coincident constitutional causative element, viz. the rhachitic condition (which involves an increased "plasticity" of the growing bones and their epiphyses) in a young individual much and contantly occupied with spinning during the period of growth. There are analogies enough showing just the influence of the chronically acting conditions of traction and pressure on young growing regions of the bones. In orthopædia this phenomenon is extensively utilised in correcting deformities of the extremities and the vertebral column. In orthodontia dentists in the same way utilise the great "plasticity" of the young growing jaw bones to correct the bad position of the teeth. It is a well known fact, too, that in certain tribes artificial deformation of the heads of the children is practised. We know that the spinning of wool and making of frieze was an extensive and economically very important domestic occupation in the Norse colonies as elsewhere, and, as we know, frieze was also a very important commodity both in trade and as a tax. (Cp. the works of Bugge, Hildebrandt, Keyser, Munch.)

Hence it is a not unlikely possibility that this individual Herjolfsnes (Ikigait) XX was a young woman of small means, probably a servant, who for many years during childhood and youth was constantly occupied in spinning. The habitual movements of the arms during this work gradually set their mark on her muscular system and skeleton in the shape of a pronounced cubitus valgus before she died at an early age.

Spinning as an intense form of domestic work, often not easily performed, is well known from ancient times, from real life as well as from folklore where it was not rarely consigned as a punishment or difficult task to the chief female character.

Of the bones of the inferior extremities we have already mentioned os coxæ when speaking of the pelvis. In addition, both femora, both patellæ, the upper third of the right tibia, and the lower part of the right fibula are present.

Figures of the femora are shown in Tabula XLVIII—XLIX—L, fig. 149—155, seen from before, from behind, and on the lateral and medial aspects.

They are fairly well preserved, only the superficial bone lamella has been knocked off or loosened here and there.

Of the right femur, extremitas inferior has been broken off from corpus by the lower fourth, but the bone may be assembled with sufficient accuracy as the figures show. The femora are of the comparatively small, slender type known from other finds in this locality, with small caput, short, rather steep collum, but with fairly strong muscular impressions, and the appearance of the trochanters corresponds well with the whole habitus of the rest of the female skeleton.

There is some platymery in both femora. Measurement gives the following dimensions:

Table 25. Herjolfsnes XX. Dimensions of Femora.

Measures of femora	Femur sin.	Femur dext.
Total length in natural position	394 mm.	396 mm.
Trochanter length	384 mm.	378 mm.
Collum diaphysis angle	128°	126°
Kneebasis femur angle	79°	78°—79°

About the kneebasis-femur angle it may be said that it is rather small, but it may be determined with sufficient exactitude. Its small size corresponds well with that tendency to genu valgum which is present and will be mentioned later on. The collum-diaphysis angle is comparatively large, corresponding with the findings in the femora of the other individuals and this is in connection with the short and low collum femoris.

The individual must have shown considerable genu valgum when the knees were kept together, and during the walk she must have kept the knees and especially the feet rather far apart.

The muscular impressions are on the whole well marked. There is a very appreciable difference in strength and thickness between the right and left femur, whereas they are almost equal in length.

Femur dext. is very distinctly more slender than femur sin. see Tabulæ XLVIII—XLIX; corpus is narrower from side to side and anteriorly posteriorly. There is also a greater convexity anteriorly of the right femur than of the left. This is also seen in extremitas sup. with trochanter major and minor, but especially in extremitas inferior which is altogether not strong, that of the right femur being appreciably weaker than that of the left. Seen especially on the lateral and medial aspects in profile the condyli lat. and med. of the left femur appear considerably larger in the sagittal direction than those of the right femur. Particularly pronounced is the difference between the medial condyles, that of the left knee being much larger. Facies patellaris is considerably larger in the left femur than in the right, and this also appears very distinctly in patellæ of which the left is not a little larger than the right (see the figures 156—157 in Tabula L of facies ant. et post. patellarum).

All these facts show with certainty that there has been a feebler development of the right femur and knee region with at any rate considerably feebler muscles on the right side. (Similar striking differences between both inferior extremities have been shown in Herjolfsnes (Ikigait) XV where, conversely, the left patella was the smallest, and the left femur was appreciably feebler than the right).

If we consider femora seen from before and behind fig. 149 and 153 there are distinct signs, especially in the right femur, of a curvature of corpus (especially above the place where the line of fracture lies), which indicates a rhachitic cause. There is a distinct tendency to true genu valgum. This is shown, too, by the low kneebasis-femur angle of 78°—79°.

The hip-joints would seem to have been sound.

Detail pictures in two-thirds and four-fifths natural size Tabulæ XLVIII ffg. 151 and XLIX fig. 154 showing extremitas inferior of the right femur on the lateral aspect and the posterior aspect show, as do also the entire views, that the knee-joints were sound (NB. Plantroots had grown into the bones).

In the left femur condylus medialis is conspicuosly large and projects considerably farther downwards than cond. lat. Especially its length and the size of the sagittal diameter are striking in proportion to the lateral condyle, as it will appear from the detail picture shown of this condyle in $^4/_5$ natural size in Tabula L fig. 155. On the medial border of the internal condyle, but only in the posterior and lateral portion (pertaining to the articulation with tibia and meniscus medialis), there is a distinctly marked arthritic bone production on the edge of the joint though not at the edge of facies patellaris, and though no pathologic symptoms are otherwise found in the left knee-joint, and the right knee-joint is quite sound, yet the finding referred to shows that already at an early age there must have been an incipient arthritis in the medial part of the left knee-joint.

Of the tibiæ only the upper part of the right tibia shown in the figure 158 in Tabula LI was present. It is penetrated by plantroots and slightly flattened (postmortally) from side to side.

There is no reason to suppose, however, that the pronounced retroversion of the superior extremity shown by this bone should not in the main have been present during life. No more exact information can be given.

Of the fibulæ only extremitas inferior of the right fibula is present with malleolus lateralis. It is a short thick and clumsy bone of rhachitic appearance, and corresponds well with and confirms the finding of a slightly rhachitic character shown by the inferior extremities, and likewise points to thick and clumsy ankle regions.

In this connection we may also call to mind the rather thick and comparatively powerful wrists corresponding to the distal ends of antibrachium. Besides work, rhachitis may possibly have had some influence.

From the length of femur the **height** of the body is calculated to be at most 145 cm., perhaps somewhat less.

The **skull** has been small. We find part of theca's bones in fragments, thereamong part of the squama of the frontal bone, and the left parietal bone is still in connection, but the bones are very frail and lamina externa is loosened to a great extent or has fallen off from the parietal bone, so that spongiosa (diploe) is seen. In Tabula LXVII fig. 198 the forehead is seen in profile, on the whole it seems quite similar to the type from Nos. XVIII and XVII with the comparatively small frontal region (see description of the skull in No. XVIII). The thin white tortuous line running from sutura coronalis across the lower part of os parietale just inside the diploe of the latter is a plant root which had made its way between the lamina externa and the diploe, and which is still adhering to the bone in a flattened and dried-up condition.

Both temporal bones (fig. 124—126 in Tabula XLI) are tolerably well preserved and partly in connection with the remains of os sphenoidale. They are shown in Tabula XLI fig. 124 seen from below, so that fossa mandibularis and tuberculum articulare (of which the left is the broadest), the small processus zygomatici and the small processus mastoidei with the rather small fossæ m. digastrici may be seen. The vascular canals for arteria carotis interna are small, likewise sulci for sinus venosi duræ matris.

The ear openings were small. The small ossicula anditiva were found, practically quite uninjured, inside the right cavum tympani and successful by preserved. The figure 127' in Tabula XLI shows malleus quite preserved even with the thin processus anterior, also incus (across processus brevis lies a little thin plant root), and stapes. Their shape and size are quite normal, they are shown $3^1/_2$ times magnified.

The remains of the orbits on the frontal bone and the remains of their borders on the partly preserved ossa zygomatica and the upper jaw showed that the eye sockets had been small and the cheekbones not prominent.

Of the **upper jaw** very considerable remains were preserved, the **lower jaw** was almost entirely preserved, only broken in two, but could be assembled. The jaws are rather short and have not been prominent. The upper jaw is broken, but can be tolerably well put together, the shape of its processus alveolaris is a fairly regular curve. The palate shows a torus palatinus (**Tabulæ LXXXI—LXXXIV,** fig. 244—255).

All the **teeth** in the upper jaw were very brittle especially the enamel, and are much worn down except the wisdom tooth on the left side. The right wisdom tooth is absent, but from the shape of the posterior part of processus alveolaris it would seem that the right wisdom tooth has been present but has been removed. There is also a distinct surface of wear on the wisdom tooth in the right lower jaw. The rest of the teeth have all been present. The following teeth now remain in the jaws: on the right side the 1st and 2nd molars, on the left side the 1st and 2nd premolars also the 1st, 2nd, and 3rd molars. Further the left canine has been lost, extracted, or knocked out shortly before the death of the individual; the alveolus (see the picture of the upper jaw in Tabula LXXXIII) being partly filled with spongious osseous tissue anteriorly, while posteriorly palatinally there is still a small hole of the alveolus left. The right canine cannot, however, have been lost, for the antagonists in the lower jaw, viz. the canine and the 1st premolar show very great wear. In the canine of the right lower jaw, however, the wear is somewhat more lingual, which would seem to indicate a somewhat abnormal articulation of the dens caninus in the upper jaw. There is no sign of caries anywhere, nor of any other pathologic processes in the teeth or their roots, and the teeth themselves are fairly powerful (except the wisdomtooth).

We further give a series of pictures (fig. 249—255) showing the two halves of the upper jaw with the teeth seen partly from the masticatory surface, partly from the buccal and from the palatinal side. To give a clear view of the details they are shown a little over the natural size, viz. 1,12:1. The wear in the teeth is very distinctly seen, here and there the outermost brittle enamel has come off. The changes are quite similar to those described in the preceding part.

Referring the reader to what has been said before about the wear in the teeth especially under case XVII, and to chapter X on the teeth we shall here emphasise how the present case XX in a pronounced degree shows the extreme wear of the teeth at this early age, abt. 25 or a little over. Half the height of the crown has been worn away in the premolars, the cusps are gone, and the dentine much exposed everywhere. The wear of the 2nd premolar is considerably less than in the 1st. As already mentioned and explained in cases XVII and X, the 6 years' molar (the 1st molar), which comes long before the other teeth, shows enormous wear, though most on the right side. The 2nd molar is pretty much worn on the right side (the enamel has, however, come off), somewhat less on the left, but not nearly as much as the 1st molar. The 3rd molar is comparatively little worn. The wear is, as normally, greatest on the palatinal row of cusps in the upper jaw, conversely to that of the lower jaw, but it is worth noting that the wear in the front teeth and premolars in the lower jaw seems particularly pronounced, and the 1st molar in the lower jaw, especially, is considerably more worn than that of the upper jaw. **For explanation see chapter X.**

The lower jaw is of the usual type from this locality, being rather short and low, but rather powerful and fairly well preserved. There is a well-marked protuberans mentalis, and the above-mentioned fracture running a little to the right of the median line, the jaw could, however, easily be assembled. Ramus mandibulæ is low, rather broad with a powerful somewhat obtuse processus coronoideus, a little narrower an the left side than on the right, the right side being seemingly also the most powerful. Processus condyloideus is only uninjured on the left side, but very much injured on the right side which, judging by os temporis, has been somewhat narrower than the left.

In the photo of the assembled lower jaw (fig. 248) the camera was focussed especially on processus alveolaris and the masticatory surface of the teeth, for which reason processus condyloideus and coronoideus are a little too much magnified by perspective. The impressions of the masticatory muscles show that they have been powerful.

The teeth are powerful, the shape of the dental arch well preserved, fairly regular, of typical form. Posteriorly there is a slight

Table 26. Dimensions of the Mandible. Case XX.

Approximate bi-condylar breadth		abt. 92 mm.
Bi-angular breadth		82 mm.
Mento-alveolar height		abt. 30 mm.
Height of ramus	dext.	57 mm.
	sin.	60 mm.
Breadth of ramus	dext.	32 mm.
	sin.	35 mm.
Angulus mandibulæ	dext.	115°
	sin.	117°

introversion of the two posterior molars, especially the left; arcus dentalis is somewhat narrow but corresponds well with the dental arch in the upper jaw. All the teeth have been present, even both the wisdom teeth, but of the incisors only the broken roots are now left in the alveolis. The dentine itself is much tanned and decalcified with humous acids and partly shrunk from the pulp cavity (see also chapter XI). On the left side only four teeth are left, viz. the 1st premolar and all three molars. On the right side six teeth are left, viz. the large canine, the 1st and 2nd premolars and all three molars (Tabulæ LXXXI-LXXXII).

All the teeth with the exception of the wisdom teeth are much worn similarly to the teeth in the upper jaw. This is very plainly seen on the right side where the surfaces of wear in the canine, premolars, and 1st molar form a perfectly typical continuous surface of wear. The enormous wear in these teeth in an individual only abt. 25 years old is very distinctly seen here! Especially the 1st molar, which has been in use since the 6th year, is almost quite worn down to collum dentis. As the enamel had partly come off before the photo was taken, the coronal dentine thus exposed at the sides was painted white to mark off the limit of the enamel. The cusps are quite worn off, and on the masticatory surface is only found a thin $^1/_2$—$^1/_3$ mm. thick plate of particularly dense dentine which was preserved, indicating the extent of the masticatory surface. This specially dense dentine had remained unaltered in position in this place, but below an empty space was found when the lingual part of this thin dentine plate broke off during the examination (see figures 246, 248, Tabulæ LXXXI-LXXXII), the inner part of the dentine being decalcified and partly decomposed (probably by the influence of bacteria and humous acids) from the inside from the pulp cavity, while on the outside a thin shell of tanned dentine is left, fairly well indicating the external shape of the roots and the crown. The edge of this thin, particularly firm dentine of tbe masticatory surface has been painted white in the pictures and is best seen in the picture of the whole jaw seen from above (fig. 248, Tabula LXXXII).

On the left side the wear in the 1st molar is somewhat less advanced though much greater than in the 2nd molar, thus there is some enamel left on the lingual part of the masticatory surface. On looking at the pictures it will easily be seen where the enamel has thus postmortally come off the 1st molars during the examination, by which their circumference has been reduced. In accordance with its eruption 6 years later than the 1st molar, the 2nd molar is certainly somewhat worn, but much less than the 1st molar. Here, too, the right side is more worn than the left. On the right canine the wear is a little atypical, more pronounced lingually. The explanation must be sought in an irregular position of the canine in the upper jaw (mentioned above), which has probably been placed somewhat more backwards palatinally. In the premolars on both sides there is strong wear which has taken away abt. half the height of the crown. The wisdom teeth in the lower jaw are powerful and well developed with four well developed cusps in the left and five in the right wisdom tooth. There are indications that the wisdom teeth have erupted rather early, as there is relatively well marked typical wear on the buccal cusps, most of course in the anterior mesio-buccal part answering to the articulation with the 2nd molar in the upper jaw. Here again the wear is most pronounced on the right side.

From this analysis of the teeth we can tell with certainty that the individual had to use her teeth from childhood (at any rate from the age of 6) to masticate very wearing food, so that this young individual at her early death had worn away almost all the 6 years' molar on the right side, and only had about one-third of the left 1st molar left, while there was corresponding pronounced wear of the incisors, canines, and premolars. In this connection the reader is referred to our remarks under case XVII and chapter X. The powerful, though short, jaws also indicate enormous exertion in mastication.

If we are right in assuming that this young woman was occupied in hard work, such as spinning, from early youth, and thus probably was either a servant or at any rate belonged to a family of no means, who had perhaps to work for their living by spinning or otherwise working for the more prosperous, we can easily understand the great wear in the teeth from poor and bad food, and we can also understand the presence of the rather strong muscular impressions and of a slightly rhachitic condition, perhaps fluctuating periodically, with undernourishment or a slighter "avitaminosis" in varying degree at different times according as the year was "good" or "bad". Just these later years in the history of Herjolfsnes testify to an increasing deterioration of the climate by which we must presume that food often became scarce, especially of course for the poor among the enfeebled population. It is worth noting, however, that there are no signs in any of the skeletons of the teeth having fallen out owing to scorbutic conditions. And as a rule the population will probably have had some access to fresh vegetable food, such as "kvannes" (angelica archangelica) or other plants, as well as small quantities of the other very efficient antiscorbutic remedies which Greenland possesses, for instance "mattak" or seal liver (see also **chapter X** on the nutrition).

If, finally, we try to draw a **general conclusion** from the results, in part conclusive, in part probable, at which we have arrived, it will be as follows:

The individual was probably a young woman, perhaps a servant or at any rate without means. She was small, at most 145 cm. of stature, perhaps somewhat shorter; rather narrow across the shoulders and chest and not broad at the hips, on the whole somewhat slenderly built and in her growing days had suffered from some rhachitis. Further, she was knock-kneed, which appeared plainly when she walked or ran. Her ankles were thick and clumsy. The right leg, though of the same length as the left, was somewhat thinner and feebler. In the left knee she had recently begun to get a little arthritis, and at times it hurt somewhat on the inside. Her head was small, the forehead low, the eye-sockets small, the face rather large though without prominent cheek bones, but the jaws were short and powerful, and the masticatory muscles strong. Her teeth had been good enough but were now much worn, so that the lower portion of the face had become shortened, but it was no wonder for as a general rule she had to be content with plain, tough, and often even bad and little nourishing fare and be thankful too. She was somewhat better off for clothes for she spun much wool year in, year out, and sometimes had some of her master's or mistress's discarded clothing given to her, for there was not much difference then between a man's and a woman's dress.[1] She was fairly strong for the muscles of her arms were well-developed and had to work much, but her arms had little by little become curiously slanting from the elbows, and it did not look nice when the forearms and the coarse clumsy hands rough with work actually projected from her body when she turned the palms of her hands forward. Otherwise it was not very noticeable, particularly when the arms were bent at the elbows or hung down along the sides with the palms turned towards the thighs.

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[1] Thus the presence in the grave of Case XX of a small round cap of propably male character (according to Dr. Nørlund) but showing a very plain and "neutral" shape, fitting obviously æqually well to heads both of male and female type, may very well be explained, and its presence in a womans grave — as the anatomical investigation has shown — speeks not again this humble cap-type as being chiefly worn by men elsewhere. Cp. also chapter II.

When she was 25 years old or thereabouts her life came to an end. Like the other inhabitants of the settlement she never grew old, life in the severe cold of these regions had gradually become too hard to live. She died and was buried in her old patched clothes directly in the damp earth, for the times when coffins could be provided for people of her sort were long since past. During the short summer in the churchyard the plants still sent their roots deep down into the soil, so that living roots at last grew all through the clothes and the dead human bodies, penetrating even into the most delicate pores of the bones, while the acid humous substances of the soil slowly and gently dissolved the hard lime of the skeleton, at the same time tanning and preserving the soft organic connective tissue substance. Some lime was, however, left, and the enamel of the teeth was too solid to be quite dissolved, it remained hard, only growing still more brittle than before.

At that period, several years or even a short lifetime later, the cold had gradually grown so severe that the earth only thawed for a shorter and shorter time each summer. At last the earth froze permanently round the body in the lower part of the grave, while the upper part of the grave still thawed for a short time every year. Finally the grave with its contents froze to the bottom and never thawed again, so that all that was still left of the bodies of the dead, the skeletons penetrated by plant roots, and the clothing in which they were encased, the simple wooden crosses which accompained them in their graves, all was preserved unchanged for 500 years.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XXI.

Young individual abt. 16—20 years, probably male (Boy) According to Dr. Nörlund the shroud was an ordinary male hood.

Only very few skeletal remains were found, mostly corpora vertebræ, of a young individual, in which the epiphyses were entirely absent, while the size of the corpora, too, indicated an age of abt. 16—20 years. The individual was presumably of small stature.

Of the teeth the following were present: 2 enamel crowns of the molars in the right lower jaw. The first molar (5 cusps, Carabelli) shows the buccal row of cusps rather worn; the other crown is most probably the third molar, it shows practically speaking no wear.

Of the teeth in the upper jaw is found a crown, also worn, of the left second molar (1st main form). It should be noted that contrary to what is usually found, it is here the buccal row of cusps that is somewhat worn, the lingual row is not worn. This latter row is not so well developed, and everything indicates a not quite normal position of the teeth.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XXII.

Probably adult. From a cut up dress of an adult.

Only a few rather worn incisors of the permanent set were found, pointing to an individual of over 15—16 years.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XXXIII.

Adult over 30 years of age. Probably a woman, which would be in good agreement with the character of the dress which could not, it is true, be put together, but was a female dress (according to Dr. Nörlund's statement in October 1923).

The skeletal remains were somewhat decalcified.

Some corpora of the vertebræ were found, especially from the lower part of the vertebral column.

Further: os sacrum which was fairly large, somewhat flat, one coccygeal vertebra, and some fragments of ossa coxæ which do not seem to have been very large.

Of the skeleton of the superior extremities a fairly powerful pars acromialis of the right clavicle was found, extremitas superior + the diaphysis of the left ulna and extremitas inferior of the right ulna, also extremitas inferior of the left radius. A few decalcified finger bones and carpal bones (os hamatum and os multangulum majus) were present.

Herjolfsnes (Ikigait) 1921(-22). Skeleton XXIV.

Adult. Judging by the dress, which was a male dress, probably a man.

The skeletal remains are for the most part much deformed and decalcified. Remnants and fragments of most parts of the skeleton are present, especially a number of tarsal bones; as far as we can judge, of a medium-sized type.

As regards the femora we note that they have a short collum femoris and comparatively small caput femoris of a similar type to that seen in certain other skeletons from Herjolfsnes (Ikigait). Corpus femoris has been fairly slender, condyli femoris (at the knee) somewhat more prominent.

From the left femur the total length may approximately be determined to be abt. 418 mm. On this basis the **height** is estimated to have been abt. 153—154 cm. (see chapter VII on the stature in general).

Herjolfsnes (Ikigait) 1921(-22). Sceleton XXV.

Adult. Age abt. 25—30 years. Possibly a man, the dress does not go against this diagnosis.

The skeletal remains are those of an adult individual. It is specially noteworthy that the vertebræ of os sacrum had not yet become firmly synostosed but were found quite separated at the places of the disci intervertebrales.

A fairly powerful corpus humeri of the right superior extremity is present, showing amongst other things a strong impression from musculus deltoideus.

Of the inferior extremities both femora are well-preserved except caput and collum femoris which are absent.

The trochanter-length of the femur may be approximately determined. It is at least 408 mm. in the right femur, and a similar length in the left femur. The **height** is calculated to be abt. 158 cm. (see chapter VII on the stature in general).

Herjolfsnes (Ikigait) 1921(-22). Sceleton XXVI.

Young individual presumably abt. 18 years of age.

A much deformed bone, the right tibia, is present, (recognisable amongst other things by the insertion of musculus popliteus) of which the upper extremity is found and abt. $^2/_3$ of the diaphysis.

The superior epiphysis had not yet coalesced with the other part of the bone, but has come loose in the line of the epiphysis and is now absent.

Among a few small bone fragmina only a fragment of massa lateralis of os sacrum can be recognised.

The age was under 20, from the whole appearance of the bone presumably abt. 18 years.

Chapter V.

The Skulls.

Among the material from the excavation of 1921(-22) the skulls or essential parts thereof which could be assembled were found preserved in cases II, XVII, and XVIII, to which must be added separate cranial bones in cases X and XX. In all these cases we gave a detailed description of the skull in its entirety and its separate bones under the separate individuals. To this the reader is referred.

Here we shall, however, give a description of **two skulls,** given to the Museum of Normal Anatomy by Mylius-Erichsen in 1905, **Ikigait 343 and 344.**

Figures of all the skulls are given for comparison in **Tabulæ LII-LXVII.** The jaws with the teeth are also shown in a group in **Tabulæ LXVIII-LXXXIV.**

Besides the measures given before under the separate individuals, all the chief dimensions and indices of the separate skulls or cranial bones which have been ascertainable have been given in the following **cranial dimensions tables I—V.** The number of measures have, however, been kept within certain practical bounds.

Only in the two male skulls Ikigait 343 and 344 has it been possible actually to measure the upper part of the face, the lower jaw and for the most part also the teeth are, however, wanting. These skulls are, moreover, the best preserved, and clearly enough of a somewhat more powerful type, especially Ikigait 344, while Ikigait 343 already shows some deterioration in size.

Skull, Ikigait 343.

Male adult, age presumably abt. 35—40. It is a small skull of a darkgrey colour. Sutura spheno-basilaris has long since been ossified. Pars temporalis of sutura coronalis is also ossified, but the other sutures are open. Sutura infraorbitalis is occlosed.

The face is low and somewhat broad. Orbitæ are large and square, there are well-marked arcus superciliares, the outermost part of the upper orbital border is prominent and thickened. The forehead is evenly rounded, low and somewhat narrow, glabella well-marked. The region of the nose is rather small, not broad, the nasal bones are rather broad in contrast to those of the Eskimos, but the lower part has been broken off post mortem and is missing. The extension of the nasal bones and the bridge (dorsum) of the nose can, however, be conclusively determined on processus frontalis of os maxillæ. The upper jaw is small, processus alveolaris with the teeth small and low. The teeth have been small, they have fallen out post mortem, all except one much worn 1st molar (with secondary dentine) on the right side. The left wisdom tooth has been small, the right does not seem to have been present. The incisors have been small, especially the right lateral incisor, the left canine has been lost and the alveolus is closed. The mandibular joints are well-developed. Ossa zygomatica are not very large. Arcus zygomaticus is somewhat prominent posteriorly, and this is all the more conspicuous because the skull is somewhat contracted in the posterior part of os frontis and at pterion, see especially the left side. There is processus marginalis zygomatis. The areas for the masticatory muscles are well-marked. Spatium between linea temporalis inf. dext. et sin. is 110 mm.

The face and region of the jaw, seen in norma facialis, show no Eskimoic characters. Seen in norma temporalis the sagittal contour is markedly North-European. There is a prominent occipital region, tuber occipitale, and some flattening above lambda, inion is distinct, but not very marked, processus mastoidei are large and descend obliquely inward. This is seen most plainly on considering norma occipitalis, which is broad, low, and markedly pentagonal. The parietal region looks more evenly arched, tubera parietalia well-marked. Seen from above in norma parietalis the frontal region is somewhat flat anteriorly with well-marked tubera frontalia. Posteriorly the cranium becomes considerably broader and is evenly rounded occipitally, but there is no very great contrast between a strikingly narrow frontal region and the much broader parietal region as in the skulls from Herjolfsnes (Ikigait) II, XVII, XVIII.

In norma basalis, basis cranii is exceedingly well preserved and shows all details plainly. Condyli occipitales and foramen magnum are not large. The grooves for the palatal muscles, the areas for musculi pterygoidei int. et ext. and for the muscles of the neck are well-marked and vigorous.

In **Tabulæ LV-LVII** we show the five normæ of this skull in abt. $^3/_5$ natural size, viz. n. facialis, parietalis, temporalis sin., occipitalis, and basalis.

For comparison with the skull Herjolfsnes (Ikigait) II, which resembles the above in many respects, we also give norma temporalis, parietalis, and occipitalis of both skulls placed opposite each other in pairs in $^2/_5$ natural size in **Tabula LVIII.**

The maximum length of the skull Ikigait 343 is 172 mm., its maximum breadth is 132 mm. Index cephalicus is 76.7.

We have already said that it was a small skull — this is most strikingly shown by the small cranial capacity. Measured in the usual way by filling with millet and checked several times it was abt. 1120 ccm. This shows that the weight of the brain was small. This skull Ikigait 343 is thus in this respect very much like the skulls found in 1921 at Herjolfsnes (Ikigait), the cranial capacity of which was still lower and whose dimensions were still smaller, of which more below (see Tables 27—31, **cranial dimension-tables I—V).**

Skull Ikigait 344 (1905).

It is a man's skull, somewhat larger and more powerful than Ikigait 343, age presumably abt. 45—50. The colour is a dark grayish brown. Occlosed (obliterated) are: sutura coronalis in its upper fourth part and in its lower third, also partly sutura spheno-squamosa. Sutura sagittalis is quite occlosed (obliterated) in its anterior part behind bregma and round obelion, there is also some closure of sutura lamboidea. The other sutures are open. **(Tabulæ LII—LIV.)**

It is a broad low cranium. Seen in norma temporalis the contour is of North-European type with broad tuber occipitale and some flattening above lambda. Inion is distinctly marked in the contour. Processus mastoidei are powerful and project considerably downward, especially seen from behind. Planum temporale is large, but there is a great distance (110 mm.) between lineæ temporales inf. of both sides. The facial angle is 89°, os that the skull is markedly orthognathic.

Seen from behind in norma occipitalis it is markedly pentagonal, the parietal region is evenly arched, but a little more prominent in the median line. Planum occipitale is rather small, planum nuchale (for the neck muscles) is large. Inion is well-marked, and there is torus occipitalis.

Seen from above in norma parietalis the skull is markedly ovoid with a slight asymmetry. On the lett side there is a large foramen parietale.

Seen from before in norma facialis the face tapers somewhat downwards. Arcus zygomatici and the cheekbones are not prominent. The forehead is broad and low. Arcus superciliares and glabella are

Table 27—31.

I. Cranial Measurements mm.

Cranium No.	Capacity ccm.	Maximum Glabello-occipital length	Glabello-inial length	Nasi-inial length	Nasi-bregmal length	Glabello-bregmatic — length	Bregma-inial length	Maximum breadth	Anterior minimal frontal breadth	Posterior maximal frontal breadth	Bi-mastoidal breadth	Basi-parietal height	Basi-bregmatic height	Basi-nasial length	Auricular height	Calvarial height (Schwalbe)	Horizontal Circumference	Nasi-bregma curve	Nasi-lambda curve	Bregma-lambda curve	Nasi-inion curve	Nasi-opisthion curve	Transversal circumference
Ikigait 343 ♂	1120	172	165	160	105	100	143	132	93	108	115 126	117	116	87	102	95	488	120	238	118	307	356	..
Ikigait 344 ♂	1290	179	172	170	113	107	142	142	96	116	127 134	120	120	88	..	94	512	130	245	115	310	363	312
Herjolfsnes II ♀	<1050	172	170	163	102	..	139	133	90	102	..	..	..	..	d. 108 s. 103	..	483	120	235	115	290	345	332
Herjolfsnes X ♀	..				c.92	..	..	..	c.74	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Herjolfsnes XVII ♀ .	..	c. 155	c. 150	c. 145	112	..	c.140[2]	125	69	85	..	..	..	..	c. 80	..	..	..	..	..	..	..	..
Herjolfsnes XVIII ♂	..	176	170	165	106[1]	..	141	125	85	98	..	..	..	..	c. 108	..	c. 480	120	238[3]	118	311[3]	368[3]	318

II. Cranial Indices.

Cranium No.	Length-breadth Index $\frac{B}{L}.100$	Length-height Index $\frac{H}{L}.100$	Breadth-height Index $\frac{H}{B}.100$	Calvarial height index (Schwalbe)	Parieto-frontal Index	Frontal curve Index
Ikigait 343 ♂	76,7	68	88,6	57,6	70,5	87.5
Ikigait 344 ♂	79,9	67	84	54.7	67.13	87
Herjolfsnes II ♀	77.8	..	..	..	..	..
Herjolfsnes X ♀	..	..	..	..	..	..
Herjolfsnes XVII ♀ .	c.80,6	..	..	..	..	..
Herjolfsnes XVIII ♂	71	..	..	..	..	..

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[1] Bregma-lambda length = 110.

[2] Bregma-lambda length = 112.

[3] Without diastasis of the sutures.

III. Facial Measurements. mm.

Cranium No.	Nasi-mental height	Nasi-alveolar height	Bizygomatic breadth	Maxillarybreadth (Virchow)	Nasal height	Nasal width	Orbital height	Orbital breadth	Palatal length	Palatal breadth	Basi-alveolar length	Interorbital breadth	Orbito-facial breadth (Schwalbe)	Facial angle	Minim. breadth of the nasal bones
Ikigait 343 ♂	..	59+	123	78	44	22	33	37	46	40	84+	21	94	c. 80°	10
Ikigait 344 ♂	..	74+	c.136	92	54	24	36	38,4	52	37+	..	23	96	c. 89°	c. 9
Herjolfsnes II ♀	(c. 99)	(c. 56)	..	..	..	..	see Text	(36)	..	..	..	c. 22+	..	..	..
Herjolfsnes X ♀	..	..	..	..	..	..	see Text	d(33) S(32)	..	..	..	22+	..	..	..
Herjolfsnes XVII ♀ .	..	..	..	..	..	..	c. 31	..	44	30	..	20	..	..	..
Herjolfsnes XVIII ♂	..	..	..	..	..	..	..	c.33	..	..	..	21	..	..	..
Herjolfsnes XX ♀ ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

IV. Facial Indices.

Cranium No.	Facial index $\frac{H}{B}.100$	Upperfacial index $\frac{H}{B}.100$ (Kollm.)	Nasal index $\frac{B}{H}.100$	Orbital index $\frac{H}{B}.100$	Inter-orbital index	Palatal index $\frac{B}{L}.100$
Ikigait 343 ♂	..	ca. 48	50	89.2	22.3	87
Ikigait 344 ♂	..	55	44.5	90	24	71
Herjolfsnes II ♀	..	..	..	..	..	..
Herjolfsnes X ♀	..	..	..	..	..	..
Herjolfsnes XVII ♀ .	..	..	..	..	..	..
Herjolfsnes XVIII ♂	..	..	..	..	..	..
Herjolfsnes XX ♀ ..	..	..	..	..	..	..

V. Mandibular Measurements.

(See also the text).

Cranium No.	Bicondylar breadth of the mandible	Biangular breadth of the mandible	Mental height of the mandible	Height of ramus	Breadth of ramus	Condylo-protuberal length of the mandible	Mandibular Angle
Ikigait 343 ♂	..	..	..	..	..	..	..
Ikigait 344 ♂	..	..	..	..	..	..	..
Herjolfsnes II ♀	c.114	c.94	27	68	28	..	c. 112°
Herjolfsnes X ♀	..	..	..	..	..	..	..
Herjolfsnes XVII ♀ .	..	..	27	..	31.5	..	..
Herjolfsnes XVIII ♂	87	82	27	d. 52 S. 51	d. 34 S. 34	d. 105 S. 112	..
Herjolfsnes XX ♀ ..	c. 92	82	c.30	d. 57 S. 60	d. 32 S. 35	..	d. 115° S. 117°

well-marked. The upper orbital border is almost horizontal, and in its lateral part processus zygomaticus of os frontis is unusually prominent. Orbitæ are large and markedly foursided. Septum interorbitale is 23 mm. broad. The nasal region and apertura piriformis are rather narrow and oblong. The lower two-thirds of the nasal bones are broken off, in their narrowest part they have been in all 9 mm., their extension may be determined on the processus frontalis maxillæ. Processus alveolaris is higher than in Ikigait 343, but the upper jaw is somewhat narrow and small. The right side of the face is smaller than the left.

Viewed from below in norma basalis this asymmetry of the upper jaw is plainly seen. Of the teeth only the right dens caninus is found, worn down to half the height of the crown, with secondary dentine. Both in the right and left half of the upper jaw part of the teeth have been lost earlier in life. Thus, on the left side molars II and III were absent, processus alveolaris being here quite atrophied while the alveoli had disappeared. Molar I sin. has been small and somewhat turned in position (see the alveolus), the roots were small. On the right side all three molars have been lost earlier in life, the alveoli have disappeared, and processus alveolaris is atrophic here, too. The facies articulares of the mandibular joints are small. By these findings the inferior development of the right side of the jaws and face is partly explained. During his latter years the individual no doubt masticated his food predominantly with the left half of the jaws. The asymmetry also appears in the rest of the skull and is plainly seen in the grooves for the masticatory muscles. Also elsewhere in foramen magnum, condyli occipitales, and processus mastoidei do we find distinct asymmetry (cp. norma basalis and norma occipitalis).

The maximum length of the cranium is 179 mm., the maximum breadth 142 mm. Index cephalicus will thus be 80. The cranial capacity is 1290 ccm., which is not much.

If now we consider these two skulls Ikigait 343 and 344 which are very well preserved, we shall see a decided similarity of type. On comparison with the three skulls from the excavation of 1921(-22), Herjolfsnes (Ikigait) Nos. II, XVII, and XVIII, (cp. Tabulæ LVIII—LXVI), the similarity will also appear very plainly. As mentioned above, this is especially emphasised when we compare in pairs Ikigait 343 and Herjolfsnes (Ikigait) II, and for the rest compare the description of this latter cranium (see the description under the separate individuals). But also for the two other skulls Nos. XVII and XVIII it holds good that mutual similarities in type and with No. II are unmistakable, to which fact we have already drawn attention in the special description.

If we compare the three chief cranial measures of these skulls: the cranial capacity (as far as it can be measured), the maximum length, and the maximum breadth (in so far as they can be determined), we obtain the following series:—

.Table 32. VI. Chief cranial dimensions.

Skull No.	344	343	II	XVIII	XVII
Capacity in ccm.	1290	1120	under 1050	small, under No. II	small, under No. XVIII
Index cephalicus	80	76.7	77.8	71	80.6
Maximum length in mm..........	179	172	172	176	155
Maximum breadth in mm	142	132	133	125	125

»Under« means »less than«.

Index cephalicus lies between 71 and 80.6. The small narrow cranium XVIII is dolichocephalic. Ikigait 343 and No. II have indices ceph. 76.7 and 77.8 respectively, and are thus what may be termed mesaticephalic, whereas Ikigait 344 and No. XVII with indices ceph. 80 and 80.6 are brachycephalic. This agrees very well with their general variation in form, but for the rest they resemble each other much in certain typical features. In our description of the individuals we have already strongly emphasised the small size of the skulls in question. This appears already in the two largest, best preserved skulls from 1905, where even the largest, Ikigait 344, has a small capacity, hence a brain weight[1]) which was still less and below the normal average for present-day Scandinavians (according to G. Retzius 1399 gr. for men and 1248 gr. for women). A step lower stands Ikigait 343 with 1120 ccm., and of Herjolfsnes (Ikigait) II it may be said that the stated small capacity 1050 ccm. must if anything be supposed to be 20—30 ccm. too large(!) since owing to the damaged condition of basis cranii a volume was assumed which at any rate was undoubtedly larger than the real capacity probably was. Of No. XVIII it may be said that its cranial capacity was at any rate somewhat less than that of No. II, and the capacity of No. XVII again less than that of No. XVIII (cp. the dimensions).

We have already before called attention to this striking decrease both in the stature of the individuals and of the size of their skulls (as far as it could be determined). A direct comparison shows how in proportion to the two larger (not degenerated) skulls Ikigait 344 and 343, the others, viz. No. II, XVIII, and XVII show a remarkable decrease in breadth as regards the two latter, and as regards XVII also in length, and this appears too in the breadth of the jaw.

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[1]) Cp. my statements on cranial capacity, brain weight, and stature, and their correlation in "De ældste Kongegrave og Bispegrave i Roskilde," 1914, p. 30—35 and the curves there given.

The part of the cranium which has suffered most and is much reduced is the frontal part and partly the occipital region, as will be very conspicuously seen in the pictures of the skulls in norma facialis and especially in norma parietalis. There is, moreover, a distinct decrease in size both in breadth and extension of pars occipitalis of squama ossis occipitis, whereas pars nuchalis has suffered less. Compare the figures of Ikigait 343, Nos. II, XVIII, and XVII, especially the last skull is very small with a very small and narrow frontal region.

This gives us the explanation of the conspicuous decrease in the cranial capacity of No. II and still more in the succeeding Nos. XVIII and XVII, for when the breadth decreases considerably in the frontal and occipital regions without being compensated by a corresponding increase of the other important diameters, the cubic content, i. e. the capacity of the skull will of course decrease. What we have said here also holds good for two, at any rate, of the other skulls, viz. Nos. XX and X, which had both comparatively small isolated skull-bones; it is plainly seen e. g. in No. X (but also in other bones). Ikigait X was, altogether, a very small individual. We may no doubt take it for granted that also the little slender individual No. XV had a similar small skull.

The jaws, however, though rather small are none the less comparatively powerful, and the same, as far as we can see, is the case with the muscles which were as a general rule well-marked.

In short, all those parts of the skull which are specially connected with the mechanical process of mastication, with the digestive and respiratory system, and which surround the organs of sight and hearing were well developed. On the other hand, **none of the skulls showed characters, not even in the jaws or facial regions, that indicated a possible intermixture of Eskimo blood!** And this holds good for all the individuals examined from Herjolfsnes (Ikigait), both in the finds from 1905 and 1921(-22). Through many years' close occupation with and examination of several hundred Eskimo skulls from all parts of Greenland (cp. C. M. Fürst and Fr. C. C. Hansen: Crania Groenlandica 1915) the characteristic features of the Eskimo skulls are so familiar to me that if they had really been found in the material from Herjolfsnes, they could not have escaped my notice, especially since my attention was of course continually directed towards this point.

The comparatively good development of the masticatory apparatus, both jaws, teeth, and muscles, in spite of the small skulls, is, as we shall subsequently see, connected with the intensive mastication work these individuals had to perform all their life (see chapter X on the teeth). But besides the stature (height and shoulderbreadth, see this chapter VII) the **theca cerebri** proper has suffered most.

In my book "De ældste Kongegrave og Bispegrave i Roskilde Domkirke," Copenhagen 1914, I have dealt with the question of cranial capacity and the brain weight, and the correlation of the latter to the statures of the historical persons mentioned therein, and given my curves showing the variation between the so-called psychic and the so-called somatic brain weight (on the basis of E. O. HULTGREN's formula in "Das Hirngewicht des Menschen in Beziehung zum Alter und Koerpergrösse," Kgl. Svenska Vetenskaps Akademiens Handlinger, vol. 49, No. 10, 1912). I must here refer the reader to my former work on this subject. Its application to the present problem — the apparently ever-increasing great reduction of the brain weight among the Norse population at Herjolfsnes (Ikigait) — is very natural. Especially if one, as I have done for 5 definite historical persons from medieval Denmark, imagines a separation between the psychic and somatic part of the brain weight carried through for the brain weight of the small, physically reduced individuals from Herjolfsnes (Ikigait), one will understand the significance of these findings, roughly anatomical it is true, but none the less very instructive, as regards their slight cranial capacity.

A great reduction at any rate of the frontal region and partly of the occipital region has taken place. When we imagine the capacity of the skull, and with that the brain weight, reduced to what is barely necessary to support life, those parts of the brain (the central nervous system) must presumably in the first place be well developed or extant which are connected with somatic life proper, for supporting material life in the strict sense of the word — everything connected with the physical functions indispensably necessary for the survival of the individual and the race and the necessary psychic functions connected herewith, thus in the first place the elementary material necessities and their satisfaction. If it requires continual and considerable mental effort to find ways and means of procuring the necessities of life, this will undoubtedly produce increased cerebral action from the earliest years in strong, healthy individuals with possibilities of development: "Need makes the naked quean spin." In man there is no doubt that it causes a greater development of the brain. Thus we can imagine how the incredibly hard but successful struggle for life (when the influence of „civilisation" does not have a directly injurious effect), carried on perhaps for thousands of years among the Eskimos in regions where all others would perish, has led to the wonderful Eskimoic culture adapted as no other to the conditions of surrounding nature in Arctic regions, this culture with its abundance of ingenious implements and contrivances, methods and customs, for preserving and sustaining a sound and vigorous life (though often a short one) in these the most inhospitable tracts of the earth. The great claims made on his powers of observation, on his capacity to draw experience from the surrounding world of nature and the animals he hunts, the necessity when aids are scarce to invent, fashion, and use a number of ingenious implements and methods so as to turn to the best account all resources at his disposal, has no doubt stimulated the brain of the Eskimo to a greater development.

And we see, then, that this people, apparently primitive in so many respects, has, as the anthropological researches have shown, an unusually high brain weight and a very high average cranial capacity (C. M. Fürst and Fr. C. C. Hansen, Crania Groenlandica).

The reverse of this fate befell the population of the Norse colonies. As the conditions of life grew harder and harder, by that deterioration of the climate mentioned in old records and of which Dr. Nörlund's important find would seem to have provided positive proof, the Norse population suffered more and more for want of nourishment. They had not like the Eskimos been adapted through numerous generations to the severe physical conditions of the arctic regions and — evidently — could not adopt, much less themselves create, a mode of living that was more "Eskimoic" and therefore better adapted to the conditions of surrounding nature. Intermarriage, too, no doubt contributed its share.

The examination of the skeletons has shown an increasing physical degeneration. By the frequent chronic undernourishment of generations the Norsemen must gradually have become weakened and stunted in growth from their very childhood; (it is a well-known fact that the "hunger blockade" had this terrible effect in Germany and Austria during the great war), and as experience from these countries showed, this very soon leads to serious interruptions in growth and other constitutional diseases. The children and young people suffered most, both in stature and weight they were far below the normal.

If we inquire what age most of the adult individuals from Herjolfsnes reached, it will rarely have been past thirty according to our experience from Herjolfsnes (the average lifetime was considerably less owing to the high death-rate among the young). If such unlucky conditions of climate and nutrition become chronic in the course of some generations, each new generation will become feebler and more stunted in growth, smaller in stature, and also — we can see it by the skeletons — get a smaller brain. The small individuals get small skulls with comparatively good jaws — though their masticatory apparatus, the teeth, is early worn away — and especially small thecæ cranii containing small brains.

Those parts of the brain which we must imagine to be best developed in spite of the reduction must be those which, by most use and thus also a greater circulation of blood, receive most functional stimulus, and these will in the first place of course be those parts which are connected with, and every day must be occupied with every thing concerning the maintenance of life, the nutrition of the body and the reproduction of the race. All other "more superfluous" intellectual life will rank second. Age-old experience has proved this. In this respect "the great war" has in great measure taught us a striking lesson, showing us that even mentally highly developed and civilised people will gradually stagnate during the daily, yearlong, painful struggle to procure the bare necessities of life, among these a far too scantily allotted ration of daily bread, a little fat and a little albumin for themselves and their children. All thought has continually and predominantly to centre about that one thing, to procure the barest necessities of life, there will neither be time nor strength left for anything else. If such hard conditions of life act continually or frequently on successive generations, and if at the same time as a consecutive the cranial capacity is, as we saw, reduced, those parts of the brain will presumably first be left behind in growth which are least used in daily life. The other parts will take their share of blood first. It is highly characteristic then that just the frontal region of the skull, and with it the frontal part of the brain, should become so narrow and much reduced, for just the cortical substance in the two frontal lobes of the brain is generally supposed specially to subserve the higher psychic activities. The parietal and temporal regions of the skull, on the other hand, show comparatively better resistance. And under here important centres in the motoric sphere and sensory sphere are localised, as well as other important functions. (The acoustic sphere and others). The occipital region, too, is somewhat reduced, though especially fossa cranii posterior for the cerebellum which is so intimately connected with the whole muscular and articular apparatus and with the motoric coordination of the movements, the static and equilibrium functions, seem to have become less reduced than the occipital region proper, corresponding to the posterior parts of the cerebral hemispheres. The space for the lobi occipitales, where amongst other things the important areas for the cortical visual spheres are found, must have been considerably reduced. Here we can of course only quite roughly indicate how it may be imagined that a great reduction of the capacity of certain parts, especially the frontal and occipital regions of the skull may indicate a corresponding reduced functional ability of the corresponding parts of the cerebrum. And we have reason to believe that this will appear especially in the reduction of the extent and capacity of intellectual life. It need not mean anything morbid or abnormal, perhaps only a strong reduction of the capacity for higher mental development of the individual. None the less the individuals in question may very well have had the intellect and cerebral activity that daily life demanded, but for the future of the race it might mean an absolute decline in mental capacity and possibilities of developing intellectual life: — "Im engen Kreis verengert sich der Sinn." This may show itself in the lack of ability to meet and surmount fresh external hardships, and may lead to stagnation which may at last become a concurrent cause of the extinction of the race, and which becomes doubly dangerous when it operates together with other unfavourable conditions, such as protracted isolation, and when **intermarriage** must have been frequent where there was no infusion of fresh blood from without.

If we keep these findings in the skulls in view, it is hardly mere idle talk when the later historical records from the declining Norse colonies (see Gr. hist. Mindesmærker a. o.) speak of intellectual stagnation, decline, and a stunted intellectual life among the Norsemen in Greenland. From Norway, the main country, only few and vain attempts were made at intervals of long years, mostly for mercantile or other fiscal reasons, to communicate with the much exposed, hard pressed, and languishing outpost of "Norse" culture in "Taakeheimen".

Chapter VI.

Reconstruction of the Face.

As of course no pictures of the people from Herjolfsnes (Ikigait) have been preserved, and as it will always be of a certain interest to gain some idea of what may have been the appearance of the individuals, an anatomical reconstruction of the face in the best preserved skull was attempted.

First a few remarks for the reader's enlightenment. That there is a certain intimate connection between the physiognomy and skull of a person has long been known; there is hardly any part of the human body in which the main proportions are to such an extent dependent on the skeleton as the head. Note, for instance, how closely the shape of the forehead and head is determined by that of the skull, how the position of the eyesockets, the nose, the mouth, the jaws, and the chin in relation to each other is given beforehand in the shape and proportions of the facial bones, and further by the greater or smaller prominence of the cheekbones, the zygomatic arches, and the angle of the lower jaw, the position of the ear-openings etc. All this has long been realised and has found its expression in the care with which the dimensions of the skull have been studied and measured. Anatomists especially brought their science to bear on this subject with a view to finding special racial characters, whereas the soft parts of the face and their significance in conjunction with the cranium for the physiognomy proper had been much less anatomically explored.

It was more particularly during the work to identify the cranium of the poet Fr. v. Schiller (and subsequently the auto-portraits of Rafael Santi) that the excellent German anatomist and anthropologist Herman Welcker in Halle laid the foundations of our present knowledge of the anatomical correlation between the special form of the cranium, especially the facial cranium, and the external shape of the head, especially the individual forms of the physiognomy. Welker's

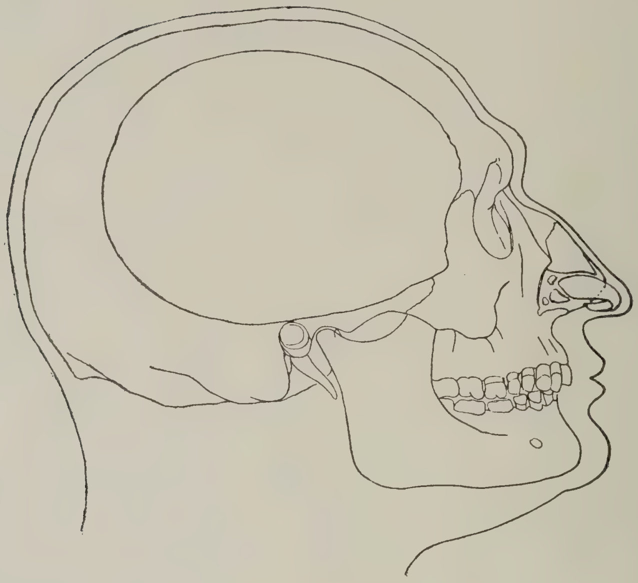

Fig. XX. King Svend Estridsøn, d. 1074 or 1076, abt. 56 years.
(From Fr. C. C. Hansen 1914.)

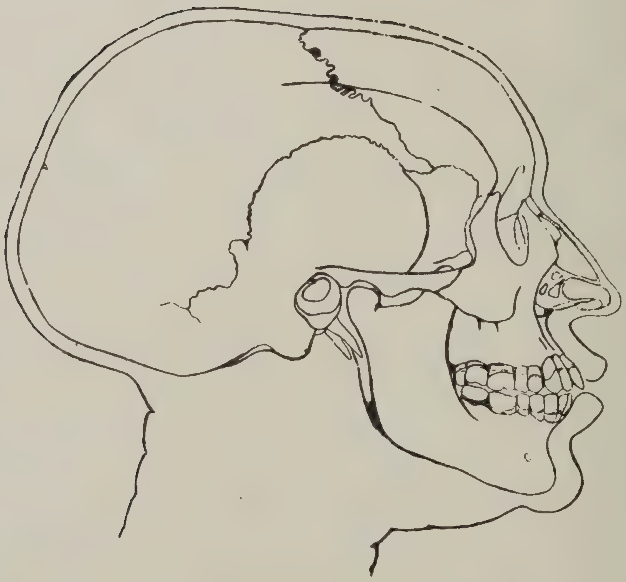

Fig. XXI. Queen Estrid, d. 1072 or 1074, abt. 70 years.
(From Fr. C. C. Hansen 1914.)

work (from 1883), dealing with SCHILLER's cranium and death-mask, and of KANT's cranium, is one of the classical works of anthropology, by which he created the first anatomical basis for these sections of anatomy. WELCKER undertook a more detailed investigation of the following problem: "What is the actual relation between the course of the facial profile and the cranial profile when we determine the thickness of the skin and soft parts on the outer side of the cranium at certain specially selected points in several human heads?" At 9 points thus selected the individual variations of the points for the soft parts were determined by direct, exact measurement of corpses. The investigations have been repeated and supplemented later on by other investigators, thus by the anatomists W. HIS, J. KOLLMANN, J. V. HULTKRANTZ, and a few more, but even if on several points there has been some change, though not any very great change, from WELCKER's figures (simply as a consequence of the increasing number of individual measurements), these investigations have, however, established a certain order of magnitude and range of variation for the measures, dependent on the individuals, on age, sex, state of nutrition (in part race), somewhat different in the different places on the cranium. WELCKER especially employed the reconstruction of the facial profile and thus arrived at very handsome and extremely plausible results.

The methods of reconstruction were subsequently in 1895 supplemented by W. HIS in Leipsic by the plastic reconstruction of the soft parts of the whole of the face, the thickness of which on the outer side of the cranium was determined by HIS in characteristic places on the whole of the face in addition to the profile-line. This method was elaborated by HIS and employed by him to identify the cranium and skeleton of the famous composer JOHAN SEBASTIAN BACH. Later on JUL. KOLLMANN (Basel) employed it to reconstruct a racial portrait of a neolithic woman from a Swiss lake-dwelling. FR. MERKEL in Göttingen made a similar couple of reconstructions shortly after, C. M. FÜRST (Lund) executed a bust of a remarkable medieval cranium in 1900, and in 1910 J. V. HULTKRANTZ in Upsala published his investigations and identifications of the skeleton of EMANUEL SWEDENBORG the famous naturalist, theosophist and founder of a new religion, on which occasion he reconstructed a portrait bust on the basis of the cranium. A few other reconstructions of a similar sort have been made later on.

As referred to under the section dealing with the statures, FR. C. C. HANSEN has, in his work on the Royal Tombs and Episcopal Tombs in Roskilde Cathedral, published in 1914, executed 6 reconstructions of facial profiles of historical persons from medieval Denmark, viz. of the Danish king, SVEND ESTRIDSØN, and his mother Queen ESTRID (the sister of Canute the Great who reigned in Denmark, England,

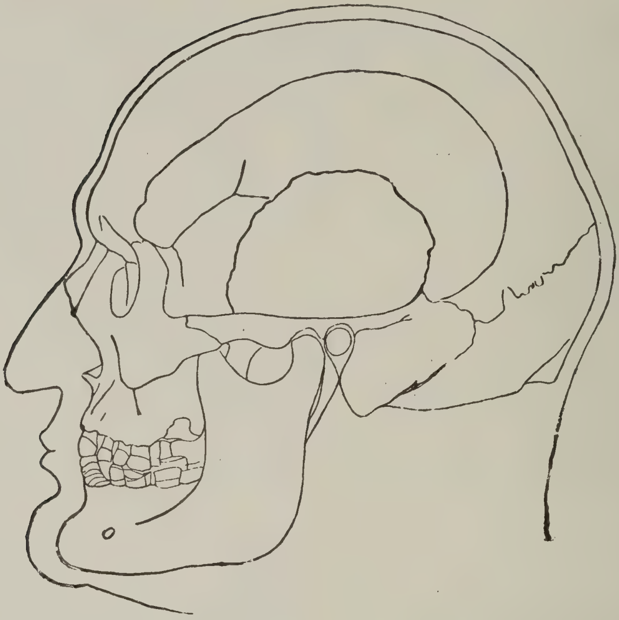

Fig. XXII. Bishop Vilhelm, d. 1074 or 1076, abt. 60 years.
(From Fr. C. C. Hansen 1914.)

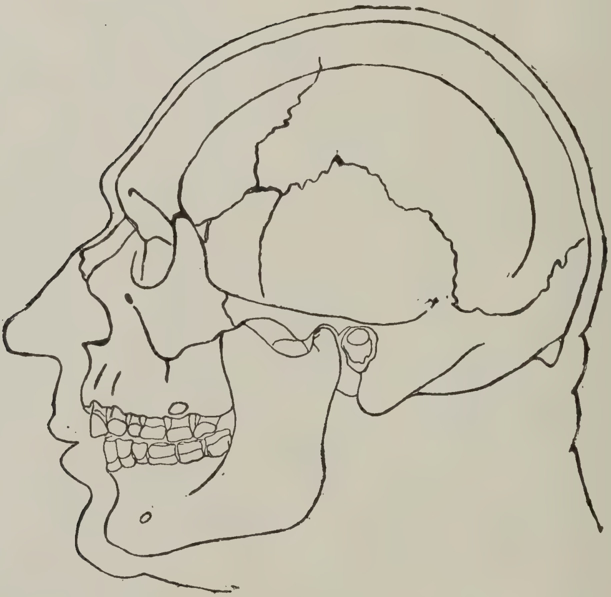

Fig. XXIII. Bishop Asser, d. 1157 or 1158, abt. 50—60 years.
(From Fr. C. C. Hansen 1914.)

and Norway), also of the two bishops VILHELM and ASSER from the same period, and of the Danish queens SOPHIA and BERENGARIA.

By applying anatomical methods FR. C. C. HANSEN was able to identify the mummy of the famous JAMES HEPBURN, Earl of Bothwell at Faarevejle church (Seeland) in 1915.

As identification and reconstruction experiments of special interest must further be mentioned C. KUPPFER's and BESSEL HAGEN's identification of the cranium of the great philisopher KANT in 1880 and WELCKER's work on the same subject (in 1883). In 1913 the large work by the Tübing anatomist AUG. V. FRORIEP on the cranium and skeleton of SCHILLER was published, and from recent years (1920—21) we have CARL M. FÜRST's great investigation of Swedish royal persons with reconstruction of the profiles of the kings MAGNUS LADULÅS and KARL KNUTSON, and of Queen HELVIG.

A summary of the main anthropological and historical investigations of this sort hitherto carried out was given by FR. C. C. HANSEN in 1921 in the work "Identification and Reconstruction of the Appearance of Historical Persons on the Basis of the Skeleton."¹) To this work and to my previous exposition in my work on the Royal Tombs at Roskilde (1914) and the literature cited therein, the reader is referred for further information as to methods and the probable degree of reliability of the reconstructions. I only wish to point out that just the reconstruction of the profile may, when it is executed with due caution and consideration of individual peculiarities of which the cranium will inform us, lead to a very satisfactory result, since the thickness of the soft parts is subject to less individual variation just in the profile-line than in most other places on the cranium; and for that reason there is often a greater probability — as pointed out already by WELCKER — that a profile that is reconstructed anatomically on the basis of the cranium will be correct than many of the drawings or portraits that are executed by an artist. Anyone who has tried studying several or all pictorial representations of one and the same historical person will often be astonished at the great differences between them. As an example I may mention such persons as MARY, Queen of Scots, or the poets GOETHE and SCHILLER, or the Danish dramatist LUDVIG HOLBERG, or JOHAN SEBASTIAN BACH, RAFAEL SANTI. Many others might be mentioned, as any expert will be able to confirm from personal experience.

As it would no doubt have been hailed with delight if in some way or other one of the familiar quite naïve, simply executed and as a rule

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¹) "Identifikation og Rekonstruktion af historiske Personers Udseende paa Grundlag af Skelettet" in the commemorative publication of the University of Copenhagen, November 1921, Copenhagen, 96 pages, 48 illustrations and list of literature.

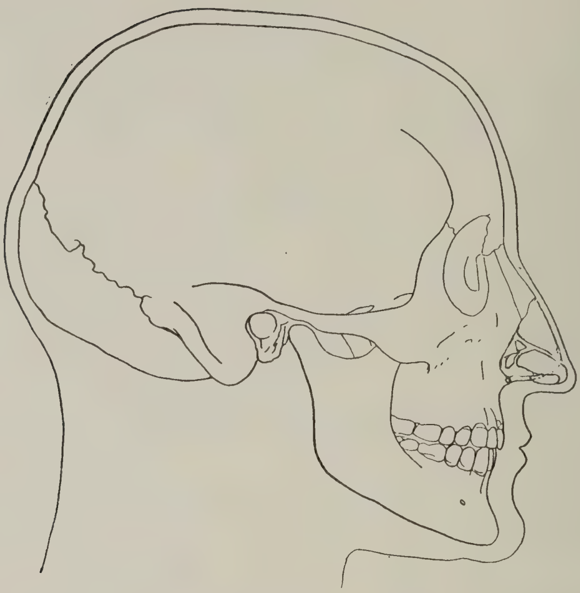

Fig. XXIV. Queen Berengaria, d. 1221, abt. 29 years.
(From Fr. C. C. Hansen 1914).

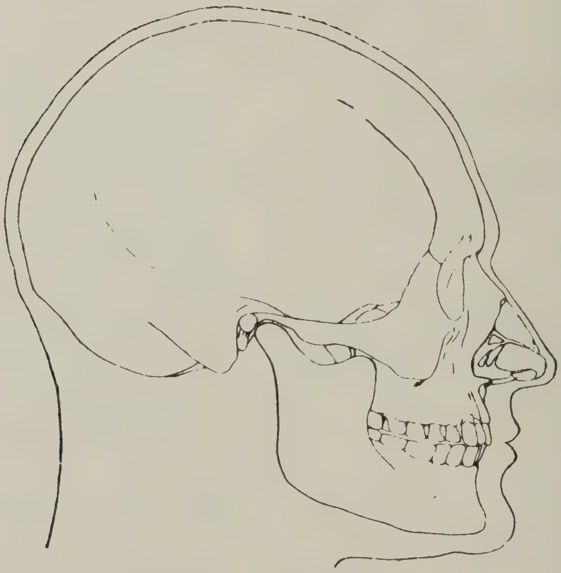

Fig. XXV. Queen Sophia, d. 1198, abt. 58 years.
(From Fr. C. C. Hansen 1914.)

not very lifelike drawings or pictures from those times of one of the inhabitants of Herjolfsnes (Ikigait) had been discovered, it does not seem out of place to attempt a reconstruction of the face over the best preserved male cranium Ikigait 343.

In the preceding remarks for the reader's guidance it has already been sufficiently shown that there will be no small probability that such an anatomical reconstruction of a portrait, executed by an expert, will come even very near to the vanished reality. The chances are of course all the better, the more completely the facial skeleton has been preserved. If this latter is complete, it will chiefly be the determination of the non-osseous parts of the external profile of the nose that may present a problem. This difficulty is, however, as a rule overestimated by the general public which, devoid of the expert knowledge of the anatomist, does not perhaps know that in the soft part of the nose there is a cartilaginous skeleton of typical build which we cannot quite freely suppose varied at will, since in a very great majority of cases it will be fairly well determined in its general main features by the relation to the form of the piriform aperture (= nasal aperture) in the skeleton and to the osseous parts of the bridge of the nose, processus frontales of both maxillæ, and of the form, size and mutual relations of the nasal bones themselves.

Even where, as in the case of Ikigait 343, the lower parts of the ossa nasalia proper were broken off, their extension could nevertheless be determined by the rim of the suture on processus frontalis of os maxillæ, and the downward direction of ossa nasalia from the preserved upper half of them could be determined with great probability as well as the cartilaginous nasal skeleton, when the common well-known type of Northern crania of which Herjolfsnes (Ikigait) 343 was a representative was taken into account. The common facial and nasal form of this type, as we know, varies in a way that is well-known to us physiognomically seen. For the profile-line of the cartilaginous nose, then, was chosen a common form, anatomically supported, and answering to conditions in the cranium, which was done in the following way:

First an anatomically probable cartilaginous skeleton was constructed and placed correctly to the apertura piriformis, and then the skin of the probable thickness was laid over it, after the thickness of the skin and soft parts had been previously reconstructed in the other parts of the anatomical profile-line on the whole upper part of the face and the calvarium. In this way a profile was obtained which might at any rate with very great probability have answered to the cranium in question and which was considerably more probable than other, more deviating forms.

The absence of the lower jaw presented another difficulty. It is obvious that in itself this need only mean that one would have to be content with reconstructing the upper part of the face from the mouth-opening (lips) upwards. The defect in the profile of a man might easily be concealed, for instance by drawing in a suitable beard. This expedient was employed, for instance by Professor C. M. FÜRST in his reconstruction of the portrait of the Swedish king, MAGNUS LADULÅS, from whose cranium the lower jaw was missing. To complete the portrait of the man from Herjolfsnes I, however, chose another alternative which naturally suggested itself. During our investigation of the skulls we have already pointed out the considerable similarity in type which

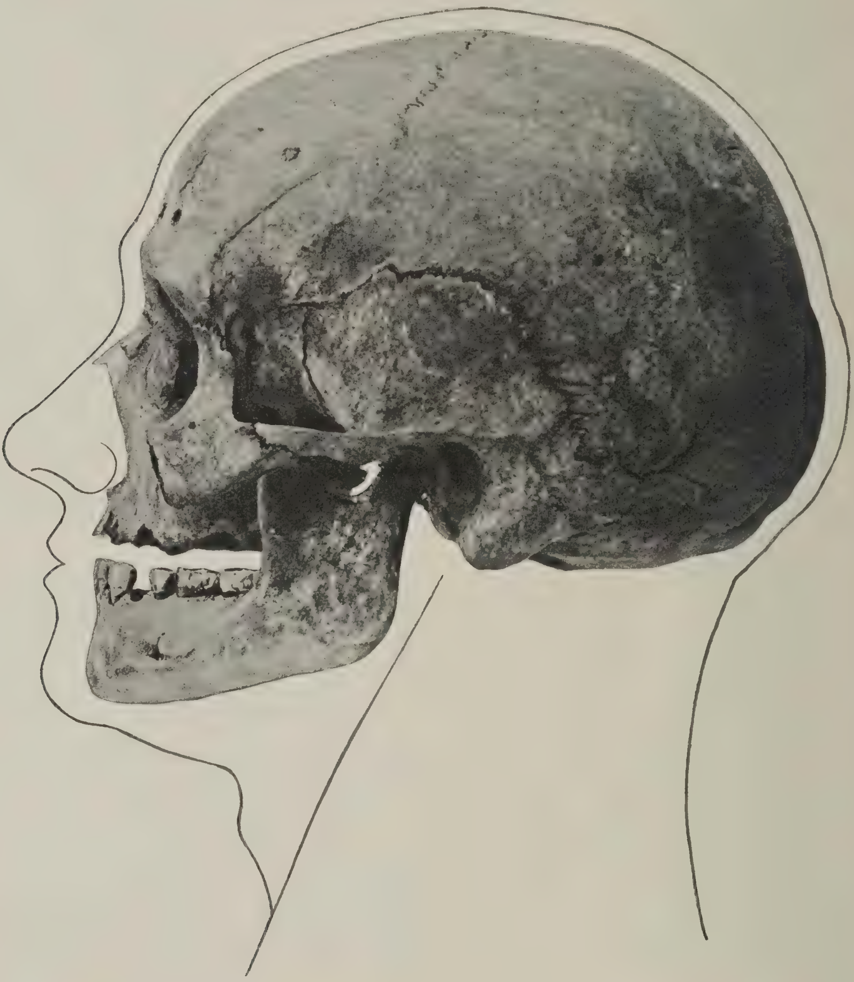

Fig. XXVI. $^1/_2$ nat. Reconstruction I.
(Fr. C. C. Hansen fec. 1924.)

the preserved crania show. In itself there is nothing remarkable in this when we consider the small population living in the later periods in great isolation, who were evidently forced into frequent intermarriage among themselves or with the equally scanty and isolated populations

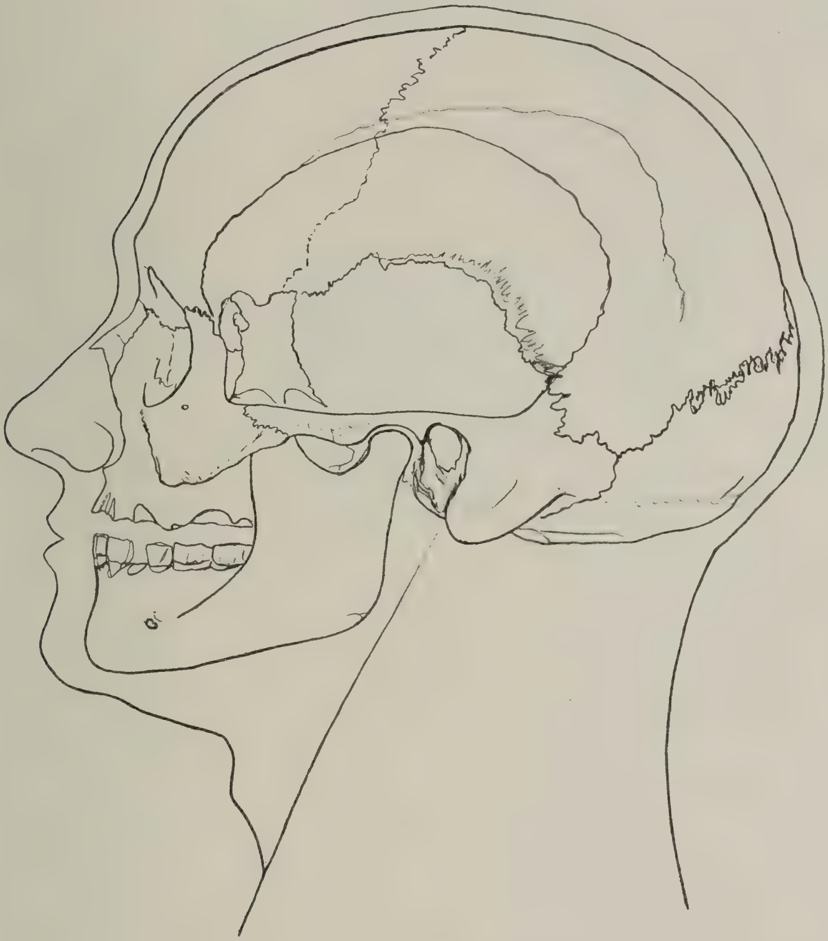

Fig. XXVII. $^1/_2$ nat. Reconstruction II.
(Fr. C. C. Hansen fec. 1924.)

on the nearest farms in the neighbouring fiords where frequent intermarriage had no doubt prevailed, too, for years.

All these circumstances must contribute to a close intermixture among the population and would contribute to equalise the types, more especially the facial types. Such often strikingly uniform types are known to develop especially among isolated small groups, for instance in isolated mountain- or fiord-valleys on small islands or in localities that have no communication or not much communication with population groups of a different kind. The isolation in Greenland during the later periods of the declining Norse colonisation must in a peculiar degree have favoured such a development.

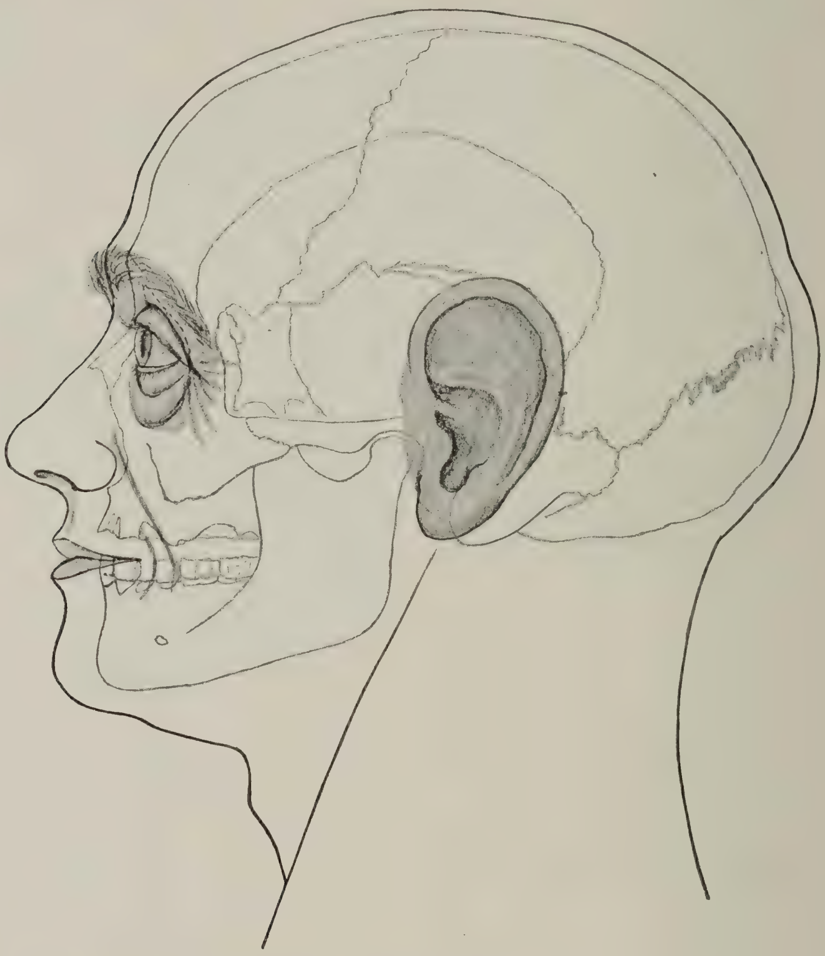

Fig. XXVIII. $^1/_2$ nat. Reconstruction III.
(Fr. C. C. Hansen fec. 1924.)

Now among the material from Ikigait there was a lower jaw (of a man) which in its general dimensions was admirably suited to supply the lower part of the face in Ikigait 343. Instead of reconstructing a suitable lower jaw for the cranium (which could have been most easily done since the position of the mandibular joint, the zygomatic arch, the impressions of m. masseter, the upper jaw, and the position of the teeth were given beforehand), the above-mentioned available lower jaw was used as a foundation for the reconstruction of the mental region. The course further taken was as follows: the correct position of the hyoid bone in relation to the cranium and cervical region was reconstructed. From this venter posterior of musculus digastricus was constructed up to the inner side of processus mastoideus and in a similar way venter anterior of musculus digastrici up to the lower side of the mental region. By this the anatomical basis for drawing the contour of the cervical region between the chin and the hyoid bone was obtained. In a similar way the anteriorly slightly convex front edge of the large sterno-cleido-mastoideus muscle was determined and, at a suitable distance (membrana hyo-thyroidea) below the concavity of the anterior cervical con-

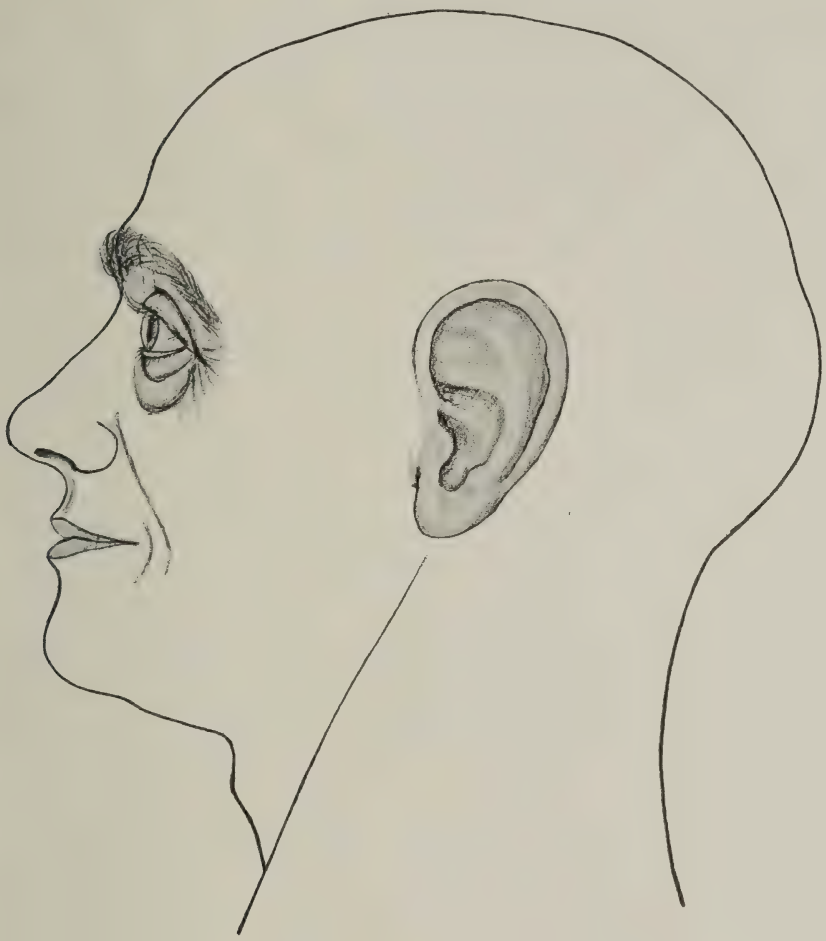

Fig. XXIX. $^1/_2$ nat. Reconstruction IV.
(Fr. C. C. Hansen fec. 1924.)

tour opposite the hyoid bone, the profile of the larynx was drawn. As it is a man the anterior upper part of the larynx, pomum Adami, projects a little here in the contour of regio colli anterior. The determination of the contour of the neck is given superiorly by inion in the transition between the muscular region and the part of os occipitale covered by the hairy skin of the neck, and so presents no difficulties.

1) The contours having thus been determined and drawn in — all on a natural-sized picture of the cranium, which is a great aid in reconstruction — see **reconstruction I,** text-fig. XXVI — a photographic negative of it of exactly the same (natural) size was taken.

I then used **a method** which I do not remember having seen employed previously for this purpose, but which is very effective, and easier than the tracing method formerly employed by me.

2) From the photographic negative a blue print was taken (Prussian blue method) in natural size; in this print, which was dried with special care and sized, partly the profile contour and partly all other contours of the picture and the bones of the cranium that were of importance were drawn in with graphite. Then the picture was made wet, and now the Prussian blue colour in it was destroyed by a suitable addition of ammonium hydroxide to the water.[1]) The blue colour is changed into a faint yellowish-brown by ferri hydroxide, which is again dissolved by means of a weak watery solution of hydrochloric acid (HCl). As the graphite drawing is not dissolved, this alone remains in the paper copy which is carefully washed and dried and sized whereupon the contours are carefully drawn again with a heavy line. In this way we obtain **reconstruction No. II** (text-fig. XXVII).

Of this another negative is taken which is again printed on "blue paper".

3) In this fresh Prussian blue print all the contours are drawn in in graphite in the same way as in the previous picture. — The Prussian blue colour in the picture is obliterated; after washing, careful drying, sizing etc., the profile contours are carefully drawn again in heavy line, but the cranial contours are only made heavier in a few places, and now the other parts of the face may be filled in in this drawing. For expert anatomists this presents no difficulty, but it must be expressly pointed out that all the places in the cranial picture where the points for measurement and construction

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[1]) Many years ago, in 1896, C. U. Maaløe indicated a method for making drawings from microphotographs by copying the microphotographic negative on common "blue" paper (Prussian blue), drawing in the copy in graphite and then destroying the blue colour with alkali (ammonium solution). The ferric oxide is removed with a weak acid, and the graphite drawing remains.

are to be placed must be marked off in the drawing beforehand (after comparison with the cranium itself).

The anatomically correct position of the parts of the face given in the reconstruction must of course be determined with care in relation to the cranium. As a good aid I have for instance drawn in beforehand the position (on the cranium) of musculus masseter, of the buccal angle, of the nasal cartilages, (cartilago septi nasi et alaris) see above, of the ala nasi etc. If the attachment of ligamentum palpebrale mediale and laterale to the internal and external rim of orbita is marked on the print, we get supports for the position of rima palpebrarum. The average size of the eye-apple, i. e. its diameter, is, as we know, very constant, and hereby is given the size in the drawing of bulbus oculi, whose position in orbita is known. In correspondence with the dimensions of the bulbus oculi and the rims of orbita, supercilium is constructed (I have made it rather heavy as it was an elderly man), and the eyelids, the wrinkles at the external angulus palpebrarum corresponding to the contraction of musculus orbicularis oculi; the deeper furrows at the eyelids and in the area round the eyes have presumably been present in an individual of that age living under such conditions as must be assumed here. The same course is taken in placing the external ear; the external opening of the osseous part of the meatus acusticus ext. is, as we know, situated a little higher than the cartilaginous part of the acoustic meatus. For the rest a not too small size of external ear was chosen on purpose — it is a wellknown fact that in many individuals the external ear grows larger with age.

As regards the lower lip and the mental region I have chosen to let the lower part of the face be slightly prominent as the front teeth in these individuals on the whole show a more orthognathic position of the surface of wear. In the same way I have chosen a somewhat smaller distance between the processus alveolaris borders of the upper and lower jaws, corresponding to the great wear of the teeth ($^1/_2$ crown height). The size and comparatively small height of the upper lip is given by the low processus alveolaris of the maxilla. I have chosen rather a large thickness of lips (within the range of variation) as there is reason to assume a powerful development of their muscles and also of the muscles of the cheek and the masticatory muscles. As regards the skin of the nose I have assumed a quite small prominence of the points of cartilagines alares. From similar considerations the position of ala nasi in relation to apertura piriformis on the skeleton was determined. On a level with the root of the nose I have let the skin be a little thicker on account of the frequently occurring slight tension of the muscles here etc.

In this way we obtain **reconstruction No. III** (text-fig. XXVIII with the cranium faintly marked.

4) Of this picture another photographic negative is taken to be used if required, and to preserve this stage of the reconstruction.

5) Finally the blue colour is obliterated as before and all the superfluous contours, while **the final reconstruction IV,** text-fig. XXIX, but without the cranium, remains.

6) After suitable drying and sizing a photographic negative is taken of this, and the prints of this may be treated in various manners, the contours may be made heavier etc. The individual might very well be furnished with a beard, hair, a cap or hood or other clothing, I have, however, preferred to omit this. To supply such a decoration or clothing one of the hoods or dresses from the find could easily have been used.

Types of the sort of face which appeared as a result of the reconstruction are well known from the Northern populations.

There must of course always be something subjective in such a reconstruction, but I consider it highly probable that the individual had almost this or a very similar appearance, in consideration, amongst other things, of the good likenesses which have resulted in previous reconstructions of the appearance of certain persons of which there existed authentic portraits.

To show how individually characteristic, and different such profile reconstructions are, I refer the reader to 6 profile reconstructions text-figures XX—XXV copied in reduced size from my work on the Tombs at Roskilde and printed in the text of the present chapter VI.

Chapter VII.

On the Determination of the Stature in General and of the Individuals from Herjolfsnes.

Under the separate treatment of each of the individuals I—XXVI in the preceding pages we have already given the probable stature and all the individual peculiarities of build and constitution, whether the individuals were of powerful, ordinary, or slight frame etc. In the case of individual No. XV the proportions of the body could also in part be calculated, while in the remaining cases no systematic measures could be taken of the skeleton of the inferior extremities owing to the defective condition of the material.

With a single exception (XV) nothing could be ascertained either about the mutual relation in length between the upper arm and forearm, between arms and legs, or between the length of femur and crus. A calculation of indices for the extremities could only be made in the case of two individuals No. II and No. XV and only to a slight extent.

Table 33. Indices of the extremities. Case II and XV.

Indices	No. II	No. XV	Recent ♀ European
Humero-radial index (100 × radius: humerus)	..	68.8	abt. 75
Femora-tibial index (100 × tibia: femur)....	..	74.4	abt. 80
Femora-humeral index (100 × humerus: femur)................................	65	75.2	abt. 72
Tibio-radial index (100 × radius: tibia).....	..	69.6	abt. 68
Intermembral index $\left(\frac{100 \times \text{humerus} + \text{radius}}{\text{Femur} + \text{tibia}}\right)$	..	72.8	abt. 68

In the table 33 we give the little we have found.

It will be seen that even the absolute measures showed that individual No. II had comparatively short upper arms, whereas individual No. XV had comparatively long upper arms, while tibiæ (crus) were in comparison too short, as was pointed out before under the special description. The figures for recent European women, added in the 4th column, only give an approximate value according to the as yet very incomplete measurements available. But our intention was only to give some idea of the trend of the deviations.

Comprehensive investigations on the somatic proportions of the women of the Northern races would be highly desirable.

The calculation of the stature of individuals discovered in graves has deservedly always claimed the interest of archæologists and especially of anthropologists, who in the course of time have elaborated various methods for this purpose, the limitations and incompleteness of which are well known to anthropologists, while archæologists and historians now and again disclose some lack of judgment, that is quite easily understood, as regards the very unequal degree of certainty we must attribute to the calculated height in each special case.

In the first place it must always be taken into account whether the height given for such an individual has been determined on the basis of the entire skeleton especially that of the extremities, and particularly the long bones of the inferior extremities, both the femora and tibiæ, (and the skeleton of the heel), and, in addition, the skeleton of the pelvis, — or whether the determination of the height in a given case has been arrived at chiefly by measuring such of the long bones of the extremities as are most important, especially femur and tibia which, as experience proves and statistics establish, stand in a certain correlation to the probable average height of the individuals.

The surest method of determining the individual stature as accurately as possible is of course given when the entire skeleton of the individual in question is available for examination. The length and dimensions of the bones of the inferior extremities may then be directly measured with a suitable addition for the (slight) shrinking of dry bones, and further a known addition for the probable thickness of the articular cartilages, for the soft parts on the heel etc., all of them things whose approximate dimensions anatomists have long since sought to elucidate. The pelvis may then be measured and the components of the vertebral column assembled, taking into account the known probable addition for the thickness of disci intervertebrales between the vertebræ. The length thus found of the vertebral column in the extended position must now be reduced by a small deduction for the normal curvatures of the spine during life (and in the dead body) which may, if possible, be imitated, and according as the height in the erect or recumbent posture of the individual is required. For in the latter case the ordinary stature is a little higher (a couple of centimeters), as the normal physiological curves of the vertebral column in the sagittal plane are slightly straightened out when the body is in the recumbent posture, but are increased in the erect posture, so that in the evening, and especially after much exercise, the stature is a little lower than in the morning after repose. If we add to this the height of the skull from the 1st cervical vertebra to the vertex of the head in the natural position of the head with a small addition for the soft parts, we shall as a matter of course get the height of the individual with the greatest possible certainty.

When such a direct reconstruction of the length of the vertebral column cannot for some reason or other be made, (difficult working conditions at the place of examination etc.), we shall nevertheless, by examining the entire skeleton, obtain such numerous and sure holds for the length and proportions etc. of the entire upper part of the trunk and of the arms in comparison with the pelvis and lower extremities, that we may by these indications in connection with the measurements calculate the stature with very great probability. It was in this way that the present writer could in 1911—14[1]) determine the heights of the four complete skeletons in the pillar graves from the early Middle Ages in the chancel of Roskilde Cathedral, viz. of King SVEND ESTRIDSØN (d. 1074 or 76), his mother, Queen ESTRID, (d. 1072 or 1074) who was the half-sister of Canute the Great, King of Denmark, England, and Norway (d. 1035), and of two bishops of Roskilde, the famous VILHELM (d. 1074 or 76), and ASSER (d. 1157 or 58), bishop ABSALON's predecessor in Roskilde.

Already before, in 1855, in the famous investigation of the Danish royal medieval tombs of "the Valdemars" in the conventual church at Ringsted (one of the earliest and best archæologico-historical investigations[2]),) IB IBSEN, the excellent professor of anatomy in the university of Copenhagen had made careful examination of the skeletons of the royal tombs at Ringsted, and had directly measured the height and dimensions of the skeletons of these unusually tall kings, VALDEMAR I (the Great, d. 1182) and his sons, CANUTE VI (d. 1202) and VALDEMAR II SEJR (the Victorious, d. 1241). Professor IBSEN also had excellent casts (plaster) made of the skulls of SOPHIA, queen of VALDEMAR the Great, and the remarkably beautiful Portuguese princess BERENGARIA, second queen of VALDEMAR the Victorious.

These investigations and casts have been elaborated by FR. C. C. HANSEN (loc. cit.) who from the casts of the skulls of the two queens reconstructed their profiles, in addition to the profiles of the four above-mentioned persons from the pillar-graves in Roskilde Cathedral (published 1914). Cp. Chapter VI in present work!

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[1]) FR. C. C. HANSEN, De ældste Kongegrave og Bispegrave i Roskilde Domkirke. Copenhagen 1914. Fol. (see p. 41 seq.).

[2]) See "Kongegravene i Ringsted Kirke", Copenhagen 1858.

In the case of anatomists it is of course superfluous to emphasise this essential difference between those statures which are thus known with great certainty on the basis of the whole assembled skeleton as the actually most probable height of the individual in question intra vitam, and those statures which are calculated with a certain degree of probability on the basis of certain of the long bones from the extremities, in the first place the thighbone (femur), next the shinbone (tibia), and in the second place the long bones of the upper extremities — humerus and radius.

But among historians or others from whom a special insight into these questions cannot be expected, some confusion may very naturally often prevail as regards this really very essential difference between the methods by which the stature is determined on the basis of the bones of the skeleton.

For if instead of finding the one most probable stature by the above-mentioned method from the whole skeleton, a stature which must at any rate be very near the real height of the person in question during life, we choose another method (which we may do as a mere supposition and for comparison with the average value) and, on the basis of the so-called Manouvrier[1]) tables, find out what statures would as a rule by the table correspond to a certain length of thigh-bone and shinbone, or humerus and radius, we may of course run the risk that the stature thus found schematically by the table will in reality be either somewhat too high or somewhat too low for the individual in question. For even though we know that, by taking for instance 100 or 500 thigh-bones of the same length and calculating the height by the determinations of the table, we may in a large percentage of cases expect that the heights found lie near the real average for the individuals to whom the thighbones had belonged, it will, however, only be possible to arrive at a certain degree of probability in the individual case. How great is the probability of arriving at the true or very nearly the true stature of the particular individual by means of the table, is dependent on several conditions. In the first place it depends on whether the bone or bones of the extremities used for the determination of the stature of a certain individual, really, anatomically and proportionally stand in a morphologically natural relation to the stature. Experience shows that when you measure the length of bone of the inferior extremities in a very large number of people of a certain race, there will be a certain high degree of probability that the majority of individuals with long legs also have a considerable height; while, conversely, those with short legs as a rule have a corresponding, lower stature, and yet everyday observation shows us that we cannot quite simply deduce the height of an individual in the erect attitude from their height in the sitting posture.

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[1]) Cp. List of literature.

The bones which experience shows us stand in the most favourable correlation to the height are in the first place the femur and the tibia. If femur or, better still, both femur and tibia are long, the individual was probably tall, provided that the trunk, neck, and head, and especially the trunk, were not comparatively small. If the bones of the upper extremities are likewise comparatively long, this is a further indication of considerable height, but common experience shows that the lower extremities may be long without the trunk corresponding in length, the arms, too, may be comparatively short — and the reverse. But in the entire skeleton it is seen at once whether there is any essential disproportion between the lower extremities, trunk, neck, and head, or the upper extremities.

In a certain large percentage of many cases there is just the abovementioned proportionality between the length of the thigh-bones — the lower extremities on the whole, and the height of the trunk. But this proportionality, that to certain lengths of femora certain statures will with a certain probability correspond, means exactly that in the given, individual case, absolute certainty cannot be attained, even though experience shows that it may with great probability be taken for granted that to long (and perhaps simultaneously powerful) bones in the skeleton of the lower extremities answers a considerable height and the reverse, all on the assumption that there have been no greater divergencies from average somatic proportions. For very tall or very short individuals the tables do not hold good absolutely. And it must never be forgotten that **sex** is above all a factor; thus, in MANOUVRIER's tables, different heights answer to the same length of femur and tibia in the two sexes, the height, if it is a woman, being as a rule somewhat less for a certain length of thigh-bone than if the same length of thigh-bone was found in a male individual. It is thus best to know beforehand whether the bones from which the height is to be calculated, belonged to a man or a woman.

Further **"race"**, and the proportions peculiar to it, are an important factor. This means that we cannot quite simply attribute the same validity to MANOUVRIER's tables, calculated on the basis of the skeletons of 100 individuals (50♂ and 50♀) from South France, for their racial kinsmen and for the tall

Northern races. To this consideration must further be added the low number of individuals on which the tables are based. This latter circumstance has repeatedly been pointed out, for instance by the Norwegian anatomist, Professor Guldberg, and others. I myself have already long ago (loc. cit. 1914) strongly emphasised these points when, in my attempt to determine the statures of individuals from the Danish royal medieval tombs, I thoroughly investigated the question of stature, and, in part on the basis of the Danish skeletal material which will be published later, convinced myself that, in enquiries concerning individuals of the Northern races, Manouvrier's tables could only be used with a certain caution.

That for the present we have nothing better, is quite another matter. It is true that Karl Pearson[1]) has, in an important paper, calculated new and better formulas for the determination of stature on the basis of this very material used by Manouvrier, i. e. 100 skeletons from Lyons measured by E. Rollet.[2]) But even if such anatomical material is elaborated according to the most accurate mathematical methods, it is self-evident that the probability and value of such averages for such variable anatomical relations as we are here considering, can only reflect or express the regularities which are beforehand implicit in the material itself (and by no means a conformity to law!). And this material, which it has no doubt been a great trouble to procure, is, we must admit, even apart from the question of race, statistically speaking very limited (100 dead bodies from Lyons). Even if it is in many cases for the time being a valuable aid to have these tables, it would be desirable that more comprehensive tables were one day worked up, for instance on the basis of material from other European races, especially those of the North with their taller stature and other deviating proportions. — It is a peculiar fact that we often find the values found for statures by means of these tables adduced without the necessary reservation, so that historians or archæologists, for instance, who are not anatomical experts, cannot possibly know that statures thus calculated by means of tables from a few bones, can at most only have the probability which the above-mentioned anatomical and statistical basis of the table provides, while it must, moreover, constantly be kept in mind, that the values are average values.

In each individual case one must always take into account that uncertainty and possibility of deviation from the average value which must attach to the use of such tables, partly on account of the small number, partly owing to its application to other classes of the population or other races than those on which the tables were based. These, so to speak inherent, imperfections cannot be done away with in the individual case, even by the most accurate mathematical calculations.

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[1]) Karl Pearson, On the Reconstruction of the Stature of Prehistoric Races. Phil. Transactions Roy. Soc. Ser. A vol. 192 London 1899.

[2]) E. Rollet, De la mensuration des os longs des membres etc. These de Lyon 1889, and Internationale Monatschrift f. Anat. vol. 6.

The greatest utility of the tables, like that of other average values, consists therein that, employed to determine the average of the statures of a population or a numerous group of individuals, they are the more likely to approximate to the true average value the greater is the number of individuals. For it may be expected that the errors by which the single individuals will perhaps have another height ascribed to them than they in fact had, will nullify each other to a great extent when the average height of many individuals is calculated, and that the individuals have sometimes changed heights will not appear in the average value.

By going over part of the material of measured bodies in the Danish Anatomical Museum, and calculating the heights of the bodies and skeletons on the basis of MANOUVRIER's tables, I have perceived numerous deviations from the values found by direct measurement.

Applying the tables to the entire skeletons from the royal tombs at Roskilde, Ringsted, and other places, I ascertained great deviations from the real dimensions which could be checked in these cases, since there were direct measurements available either of the bodies or skeletons in the graves, or of entire skeletons. In such definite cases one would, on the whole, incur the risk of coming to incorrect or misleading results, by the schematic application of the tables referred to, to these known historical skeletons. And it is worth mentioning that even some of the greatest heights from these Danish royal tombs have parallels among the measured bodies at the Danish Anatomical Institute, and MACKEPRANG's[1]) enquiry into the height of conscripts in Denmark during the years 1904—05 shows parallels with numerous individuals who were just as tall, while some of them must even be assumed not to have been full-grown at the time of the enquiry.

For the discussion of statures in the Northern countries we must specially direct attention to C. M. FÜRST och GUSTAV RETZIUS' Anthropologia Suecica, also to papers by FÜRST, HULTKRANTZ, GULDBERG, ARBO, HALFDAN BRYN, FAYE, SCHREINER, SØREN HANSEN, FR. JØRGENSEN, and to "Meddelelser om Danmarks Anthropologi".

Further, I refer the reader to my paper on the tombs in Roskilde

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[1]) Medd. om Danmarks Anthropologi I. 1907—11.

Cathedral (1914) with its very elaborate discussion of the question and the literature referred to.

As the majority of the population in Greenland originated from Iceland, from which country Greenland was settled by the immigration of a large number of families in the course of a comparatively short space of time after its discovery by Eric the Red, and as Herjolfsnes (Ikigait) was for a long time the best port of call for those vessels from Norway that traded to Greenland, it would seem natural to use the physical proportions of the population of these countries by the side of the other Northern races. As yet there exist no tabulated particulars for these populations with regard to the calculation of the stature from the long bones of the extremities; but we have a paper from 1914 by A. L. Faye,[1] "On Stature, especially among the Northern Peoples", in which this author tries to find a formula for the calculation of statures on the basis of an enquiry into the height and trochanter length of the thighbone of several hundred Norwegian soldiers from all parts of that country.

For 480 troops from the whole of southern Norway the true mean length of the thigh-bone (i. e. the trochanter length) was abt. 45 cm. For the Bergen and Sørland districts it was not fully 45 cm., but for people from the Trondhjem district it was longest, viz. 45.5 cm. and these people are noted for their extreme tallness. According to Halfdan Bryn,[2] the great length of the tibiæ is here a factor, too.

On the basis of the trochanter length of the thighbones, and the stature, Faye now lays down a method for finding, from the trochanter length, the stature of individuals found in tombs. He thinks it is of no great importance to make corrections for the thickness of the cartilages or the slight shrinking of the dead bones.

With a trochanter length of femora of abt. 45 cm. the length should be multiplied by 3.82—3.83, most correctly perhaps by 3.825, since the present average height lies between 171.9 cm. (= 45 × 3.82) and 172.35 cm. (= 45 × 3.83).

But when very large thighbones occur, measuring 48—50 cm., the length should only be multiplied by 3.79—3.80. With comparatively small thighbones, of 44 cm. or less, the length should be multiplied by abt. 3.85.

As far as can be seen, he says, there is no reason to make any difference in the method of calculation for male or female thighbones, systematic measurements of women are, however, quite lacking. In this latter opinion Faye will hardly meet with general support, though it is possible of course that conditions in Norway may be different from those of other countries or other strata of the population, or that the method of calculation, and especially the measurement of living individuals must be so approximate that the deviation which occurs will be of no great importance. For the present, however, we must await further developments in this respect.

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[1] A. L. Faye, Kristiania Videnskapsselskaps Forhandlinger for 1914, No. 6.

[2] Anthropologia Nidarosiensis 1920.

For the calculation of the **statures** of the Norse population at **Herjolfsnes (Ikigait)** only scant material is at our disposal. We can find the approximate height of the following individuals only: I ♀, II ♀, XI ♂, XII ♀, XV young ♀, XIX ♀, XX ♀, XXIV ♂?, XXV adult, i. e. 9 cases out of 25 or a good third of the whole material.

My mode of proceeding has been to calculate the height according to Faye's method as if the individuals were **Norwegian men,** it is then probable that the figures for the women will not, at any rate, be too small; and as we know, from the particulars we have in regard to the other proportions of the skeletons, whether the individual was slenderly or powerfully built, and whether most probably small or more wellgrown judging by the bones, this knowledge has been utilised to make a deduction, in the case of a female skeleton from the male stature found as above. By doing so we are in accord with the general experience of anthropologists, and as this deduction made, as will be seen in the following, is comparatively slight, (abt. 2.5—4 cm.), we may with a certain probability take it for granted that the value given represents a maximum height.

For the sake of comparison the height has **besides** been calculated by Manouvrier's tables by which it must be kept in mind what was said above. In this investigation it has been further confirmed that these tables, based as they are on individuals from the south of France, give values that are too low when we wish to determine the stature of the tall, powerfully built Northern race, while, in the case of a partly degenerated, enfeebled, short, and slender population like the one from the graves at Herjolfsnes (Ikigait), the tables give values that are too high. For it is absurd that, if we calculated the height of the small slender women from Herjolfsnes by Manouvrier's tables based on the proportions of women from southern France, we should get a higher stature for them than if we reckoned it equal to that of present day Norwegian men! (soldiers)! according to Faye's enquiry. It is further seen in examining Manouvrier's tables, that the same length of femur gives a smaller stature for women than for men.[1]) This seems to point to a difference due to race (amongst other things a comparatively greather length of the trunck in proportion to the lower limbs in the women of southern France).

In the following we shall now give the calculation of **the probable stature in the 9 cases from Herjolfsnes (Ikigait)** in which such calculations can be made, and with the reservation which we showed above was necessary in regard to the strict accuracy of the probable statures thus found, we emphasise that we regard them as **approximate maximum heights** for the individuals in question, though with the further reservation that where there was pronounced deformity, such as scoliosis, kypho-scoliosis etc., it must of course have had an influence on the stature of the individual, while at the same time, owing to the defective condition of the material, we are debarred from knowing quite certainly the probable reduction of the stature thus caused. The appended **table** shows the statures of the various individuals.

Table 34. Statures of 9 Individuals.

I ♀ 30—40 years. (Kyphoscoliosis) Height 150 cm. without kypho-scoliosis, but must have been really less than 145 cm.
II ♀ 25—30 years, abt. 138—140 cm.
XI probably ♂, over 35 years, abt. 162 cm.
XII probably ♀, adult. Max. 142 cm.
XV ♀ 20—25 years, abt. 138—140 cm.
XIX probably ♀, 25—30 years. Max. 144 cm.
XX probably ♀, abt. 25 years, Max. 145 cm.
XXIV probably ♂, adult. Abt. 153 cm.
XXV possibly ♂, adult. Abt. 158 cm.

From the dimensions of the long bones of the extremities given under the various individuals (chapter IV), the height in the erect posture was calculated, the fact being taken into account that the bones were dry and devoid of articular cartilage, while all other particulars given under the various cases were also considered. As the same length of bone, here as a rule the femur, answers to a somewhat lower stature in a woman than in a man (cp. our remarks above), I am of opinion that also the heights determined for all the individuals by means of Faye's enquiry and statements, by which the heights of the women have been calculated as if they were Norwegian men, must in the case of the women be reduced by a suitable deduction, the approximate extent of which must for the present be determined by means of Manouvrier's tables. In the case of individuals with kypho-scoliosis or a probably more pronounced common scoliosis, the height most probable for normal individuals will of course be somewhat — often considerably — reduced; how much can, as we said, in the given case only with difficulty be estimated when the skeletons are as defective as those of the present material.

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[1]) Cp. also the remarks on this question in Martin's Lehrbuch d. Anthropologi, 1914.

Individual I. Female, 30—40 years, (dress to correspond) fairly powerfully built but with the upper part of the body and the arms somewhat slender. Humpbacked (kypho-scoliotic etc.) Femur dext. total length 416 mm. trochanter length 398 mm.

According to Manouvrier the height for a man would be 159.2 cm. and for a woman abt. 154.5 cm. According to Faye's calculations for Norwegian men, the same height as the above is arrived at for a woman (after Manouvrier), viz. 154 cm. In the case of a woman like Herjolfsnes I who, judging by the skeletal remains, had a rather slender upper part of the body and arms, it must no doubt be assumed that her height was at least 4 cm. less than in the case of a Norwegian soldier of the same length of femur.

150 cm. must thus no doubt be regarded as the maximum for this woman, and as she had a very pronounced kypho-scoliosis, her real height intra vitam was no doubt somewhat under 145 cm.

Individual II. Female (dress to correspond) 25—30 years, a rather slender person with some genu valgum, somewhat rhachitic, and with a sligter degree of rhachitic scoliosis. Femur sin. total length 390 + mm., trochanter length 368 + mm. Humerus dext., length 257 + mm., humerus sin. (best preserved) length 253 + mm. According to Manouvrier the height calculated from femur would be 147.7 cm. in the erect posture, while calculated by the mean of humerus dext. and sin. it would only be 137 cm.(!) hence there would be a difference of 10 cm. If we take the mean of these two values the height would be 142.3 cm. At any rate it is seen that the superior extremities and the upper part of the body are comparatively short and slender, which corresponds with what is as a rule found in individuals from this locality.

If now we calculate the height of this woman according to Faye, as if it were a Norwegian man, a height of 142.4 cm. in the erect posture will be found from the trochanter length (for fresh bones) of femur.

Hence if the height of this woman is calculated from femur as that of a Norwegian soldier, we find a height that is 5 cm. less(!) than if she were calculated as a woman of southern France according to MANOUVRIER; and even if this difference in the calculation according to MANOUVRIER is counterbalanced by taking the mean of the heights calculated by her femur and by her too short upper limbs, she would at any rate, if she were calculated as a women of southern France, get the same height as a Norwegian man of the same length of femur(!) and that in spite of the upper part of her body and her arms being comparatively short, otherwise her height according to MANOUVRIER would be greater. From this it will be seen that we shall more probably get nearer to the real height intra vitam if we deduct abt. 2—4 cm. from the height calculated according to FAYE for a Norwegian man, because the upper part of the body and the superior extremities of this woman were comparatively slender and short, and she suffered from a slight degree of scoliosis. Hence a height of 138 to 140 cm. in the erect posture must be regarded as the most probable.

Individual XI, adult, probably male (male dress). Over 35. The lower extremities fairly powerful. Sternum small. Femur sin. somewhat injured. The total length must presumably be estimated at 440—450 mm. The trochanter length may probably be calculated on the analogy of case I, and proportionally 2.5 cm. less, i. e. abt. 42 cm.

According to MANOUVRIER these measures give a height of abt. 164.5 cm. for a man in the erect posture, and abt. 160 cm. for a woman. According to FAYE we get abt. 162 cm. for a man (abt. 158 cm. for a woman in the erect posture). MANOUVRIER's material evidently gives too great a length of the upper part of the body with these shorter lengths of femora.

Hence the height must most probably be assumed to be abt. 162 cm., though perhaps this figure is a little too high.

Individual XII, adult, probably female. The skeleton of the upper part of the body and the arms has been comparatively more slender than that of the lower extremities. Femur dext. (in best preservation) total length 380 mm., trochanter length 365 mm.

Femur sin., approximate total length 365 mm., trochanter length 348 mm.

If we take the right femur which is best preserved, the height for a woman in the erect posture will according to MANOUVRIER be abt. 145 cm. If we calculate the stature according to FAYE as for a Norwegian man, we shall get 141.3 cm. For a woman whose skeleton is of the nature above described we can then at most reckon 139 cm. The average of the values for women found from MANOUVRIER and

Faye lies at 142 cm. This latter value I am inclined to think too high for the individual in question, if it is a woman; at any rate 142 cm. must be regarded as the maximum value. The stature was more probably a little under this.

Individual XV, young female, between 20 and 25, very slight, thin and slender. The upper part of the body small narrow across the chest and shoulders. Femur sin., total length 376 mm., trochanter length 368 mm. Tibia dext., total length without spinæ abt. 275 mm. Humerus dext. 283 mm., humerus sin. 282 mm. Radius dext. 195 mm. The height calculated in the erect posture from the femur would according to Manouvrier be 144 cm. for a woman, but according to Faye 142.5 cm. for a Norwegian man. For this young woman we can scarcely reckon more than 140 cm. or more probably less. Under the description of the skeletons in chapter IV we gave a comparison between the measures and proportions of this individual (XV) to which we refer the reader. If we now try the experiment of calculating the stature on the basis of the various bones according to Manouvrier's tables (keeping in mind that they must, as we said before, be used with caution), we arrive at the following greatly varying results for the stature calculated by these tables, which gives a very good illustration of our criticism above of the schematic use of these tables in individual cases.

The stature of individual XV, calculated by Manouvrier's tables (erect posture):

Table 35. Stature of Individual XV calculated accord. to Manouvrier.

For femur sin.	144 cm.	According to the lower extremity.
For tibia dext.	132 cm.	
For humerus sin.	149 cm.	According to the upper extremity.
For humerus dext.	149 + cm.	
For radius dext.	142 cm.	

The individual has thus had comparatively short lower extremities, especially shinbones (crura), while the arms, especially the upper arms, were comparatively long.

By Manouvrier's tables the height of this individual calculated by the upper arms, humeri, would be 149 cm. but 17 cm. less calculated by the shinbone, viz. 132 cm., while the thighbone gave 144 cm. and radius 142 cm. A better illustration of the errors which may occur in individual cases, when the figures are taken schematically from a table, can hardly be imagined.

If we consider the heights according to Manouvrier, calculated by the femur for a woman of southern France, = 144 cm., and the heights we get according to Faye for a Norwegian man, = 142 cm., they are in better correspondence, but for a woman such as this, they must be less than calculated for a man of her own race.

If we compare the stature calculated according to Manouvrier from humerus and radius from the upper extremities, taking the mean value $\frac{149+142}{2} = 145.5$ cm., with the stature calculated from femur and tibia from the lower extremities which gives $\frac{144+132}{2} = 138$ cm., we arrive at heights lying near the values referred to before as probable according to Faye. And as now the total length of the lower extremity has before been determined (see description of case XV) by direct measurement of the skeleton with considerable accuracy, while we know that the skeleton of the entire body (also the trunk) was conspicuously small and slight, we may with pretty great certainty form an estimate of the stature intra vitam of individual XV.

The dimensions of the lower extremity must here be decisive.

Table 36. Stature of Individual XV in erect posture.

according to Manouvrier	calculated from	according to Faye
♀ 144 cm.	femur	♂ 142.5 cm. ♀ $<$ 140 cm.
♀ 132 cm.	tibia	....
♀ 138 cm.	femur + tibia, mean	....

According to this and the whole build of the individual it must be considered probable that the stature in the erect posture has been abt. 138—140 cm. hardly more, possibly somewhat less.

Individual XIX, probably female, 25—30 years. Rather slightly build and somewhat scoliotic.

Femur sin., total length 396 mm., the trochanter length may with great probability be reckoned to be 15 mm. less, i. e. 381 mm. According to Manouvrier we get from this for a woman a height of abt. 149.5 in the erect posture. According to Faye the height for a Norwegian man in the erect posture will be 147.5 cm. which, according to what we said before, must presumably answer to a height of 144 cm. for a woman. To be on the safe side and avoid putting too low a figure, we may reckon with 146.5 cm. for a woman, and as the individual was slightly built and had some scoliosis, 144 cm. will no doubt be the maximum height in the present case.

Individual XX, according to the skeleton (and most of the dress) with predominant probability a woman, abt. 25 years. Some rhachitis. Cubitus valgus, slightly built, upper part of the body small, conspicuously short collum femoris.

Femur sin., total length 394 mm., trochanter length 384 mm. Femur dext., total length 396 mm., trochanter length 378(!).

According to Manouvrier the height of a woman in the erect posture would be abt. 149 cm., according to Faye, by striking the mean between the measures for the right and left sides, it would be abt. 147.3 cm. for a man; for a woman such as this, 145 cm. would most probably be a maximum value, the stature may very well have been somewhat lower, compare XIX.

Individual XXIV, adult, probably a man by the dress which was a male dress.

Femur sin. The total length is approximately determined to be 418 mm. As it should most probably be a little less, the height may, according to Faye, be put at abt. 153 cm.

Individual XXV, adult, possibly a man. The dress does not contradict this conjecture. The skeletal remains show that it was a fairly powerful individual.

Femur dext. The trochanter length can be determined, it is at least 408 mm.

Femur sin. a similar length.

From this, according to Faye, we get the height of abt. 158 cm. for a man in the erect posture.

From this survey we obtain the following interesting **results, grouped according to the heights:—**

Table 37. 9 Individuals grouped according to the Statures.

Men	Case	Women	Case	
162 cm.	XI	145 cm.	XX	
158 cm.	XXV	(150 cm.)	I	kyphoscoliosis, therefore less than 145.
153 cm.	XXIV			
		144 cm.	XIX	
		142 cm.	XII	
		140—138 cm.	II and XV	

Cp. text-fig. XXX.

The height of the three men thus lies between 153 and 162 cm., that of three of the woman between 145 and 142 cm., that of two of the women between 138 and 140 cm. One woman's normal height lies at abt. 150 cm. but as she had a severe kyphoscoliosis her height must at any rate have been under 145 cm., most probably less.

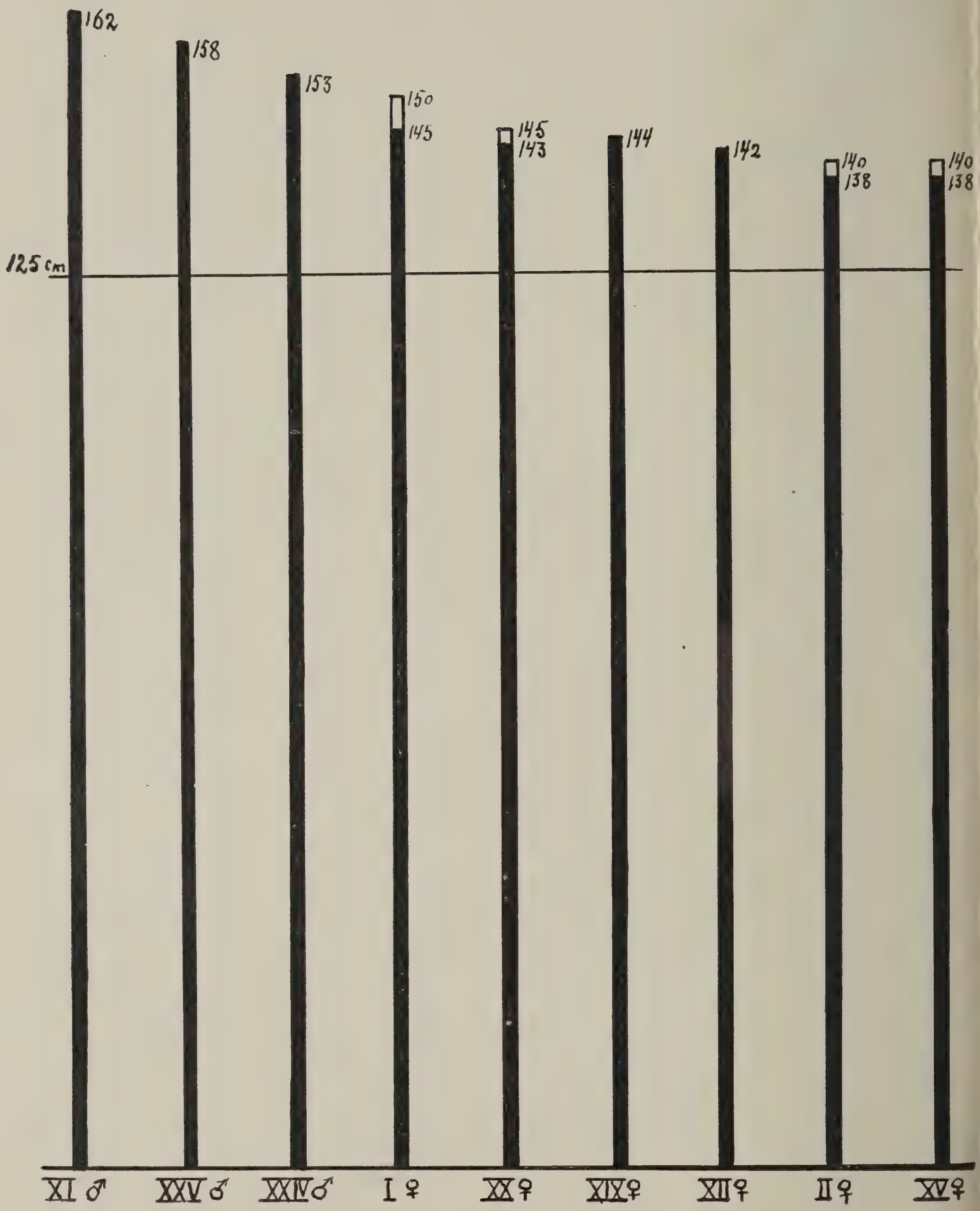

Fig. XXX. The Individuals grouped according to the Statures.

Since now the entire number of the adult or nearly adult individuals of over 20 years of age was 21, and we have been able to determine the heights of 9 individuals in all, which corresponds to fully 0.43 part of all the cases, and since none of the other 12 adult individuals, of which remains were found, showed signs of having been taller or more powerfully developed than the 9 whose height could be measured, we may no doubt take it for granted that the heights found in this random sample of the population **give a fairly reliable picture of the short stature of the population of Herjolfsnes in later times,** the proportion of the measured 9 cases to the unmeasured 12 being as 3 to 4 of the total number of adults.

As the determination of sex was made at an earlier stage of the investigation and on the basis of several different factors, (cp. the dresses), it is eo ipso precluded that the height can have played any part in the anatomical determination of this question.

It is then very enlightening to see that the three greatest heights belonged to men (between 153 and 162 cm.) while the heights of all the women lay at or under abt. 145 cm. Only the most powerfully built kyphoscoliotic woman (I) would in normal condition have been abt. 150 cm.

The heights of three of the women lie at abt. 140 cm. of two most probably below this figure. Only two of the women who were of nearly the same height reached abt. 145 and 144 cm. respectively. The women especially were thus not only small of stature, but in addition to this a conspicuously large number of them are of a slight and feeble build, they are narrow across the shoulders, narrow-chested and in part narrow at the hips. Several show symptoms of rhachitis, deformity of the pelvis, scolioses, and great differences in the strength and size of the right and left lower extremities. Compare further chapter XII: The coffins.

The tall Northern race has thus degenerated into small, slight, and delicate women, and corresponding slightly taller men, a striking example of the well-known effect of chronic undernourishment (see chapter X) and hard conditions of life on a population, especially on the physical development and stature of the children and younger individuals, when the injurious influence extends to several generations.[1]

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[1] Cp. the small type of horse, the pony and others.

Chapter VIII.

Age of the Individuals.

For a strikingly large number of the individuals the age could, as we have previously mentioned, be determined very conclusively by the stage of growth of the skeleton and epiphysis lines. Of the 25 individuals from Herjolfsnes (Ikigait) subjected to examination 21 were adults and 4 children or quite young individuals under 16—18 years. Of the 21 adult individuals 4 could only be determined generally

Table 38. Survey of the distribution of age-groups within the total material.

On the total 25 individuals these were					
adults	♂	♀	individual	total	
30 years or, perhaps somewhat above	3	2	2 (+ 1)	8	11(10) individuals were thus 30 years or somewhat over 30.
over 35 years	1			3	
30—40 years		1			
abt. somewhat over 30 years		1			10 individuals were between 18 and 25—30 years of age.
30 years and over, total	4	4	2 (+ 1)	11	
25—30 years	2	3			4 were 11—16(20) years.
20—30 —		1			
22—25 —	1				Thus, of the total adult individuals, 11 at most had reached the age of 30 and upwards, though they had hardly grown very old, while almost the same number, viz. 10, died between 18 and 25—30 years before the growth was quite completed.
22 —		1			
18—20 —		1			
>18(-20)—			1		
18 yrs. and 25—30 yrs. total	3	6	1	10	
Children and young people					
16—(20) years	1				
15—16 —	2				
11—12 —			1		
children and young people, total	3		1	4	

as adults, 1 of which was under 30 years of age. Of the remaining 17 adults there were 7 adult males of which 3 under 30 years of age, and 10 women of which 6 under 30 years of age.

Of the total 25 individuals 14 were undoubtedly under 30 years, viz. 3 men + 6 women + 1 adult + 4 children. For the remaining 11 adult individuals the age of 3 could be determined to be somewhat above 30 (1 man and 2 women), while the remaining 8 adult individuals (3 men, 2 women and 3 adults) must be abt. 30 years (or perhaps somewhat above). None of the adult individuals showed signs of belonging to the higher age-groups (the cranial sutures were open).

The **table No. 38** gives a survey of the distribution of age-groups within the total material.

The following **3 tables No. 39—41** shows the age of the various individuals arranged as far as possible according to the sex.

Table 39. Age of the individuals grouped according to sex.

adult males	number	No.	adult females	number	No.
over 35 years	1	XI	30—40 years	1	I
25—30 years	2	VII XXV	over 30 years	1	XXIII
22—25 years	1	XVIII	20—30 years	1	XVII
adults in general over 30 years	3	V IX XXIV	25—30 years	3	II X XX
total ♂	7	..	22 years	1	XV
under 30 years	3	..	18—20 years	1	VI
			adults in general over 30 years	2	XII XIX
			total ♀	10	..
			under 30 years	6	..

Table 40. Age of adults, sex uncertain.

adults	number	No.
adults over 30 years	2	XIII XIV
adult perhaps over 30 yrs.	1	XXII
> 18—20 years	1	XXVI
total	4	..
under 30 years	1	..

Table 41. Age of young people and childern.

young people a. childern	number	No.
16(—20?) years	1♂	XXI
15—16 years	2♂	VIII XVI
11—12 years	1	IV
total	4	..

From these figures it will appear with all plainness how comparatively high the death-rate must have been. If we take all the individuals that were beyond doubt over 18—20 years, which will be 20 = $^4/_5$ of the total material, 10 = half of these had died before their growth was quite completed, i. e. before the 30th year, and of these again 4—5, i. e. one-fourth had died before or about their 25th year.

Here again it is striking that among the 10 individuals that died between 18—(20—30) years, hence before the completion of growth, there were 3 men, but 6 women, i. e. double the amount.

We shall hardly be far wrong if we look for one of the causes of this in the dangers which pregnancy and parturition must involve for these women especially, considering the frequency with which poor physical development and amongst other things contraction of the pelvis and other pathologic conditions evidently occurred. For we are no doubt justified in considering the skeletal material at hand as representing a good allround random sample of the small population at Herjolfsnes from the period in question.

A supplement to the information in hand has been gained by the study of the **dimensions of the coffins,** see chapter XII, of which we shall subsequently give an account, for the purpose of gaining information about the stature and shoulderbreadth. We remind the reader that all skeletal remains in the coffins were quite decomposed.

Of 31 empty coffins which were measured, 17 were for adults, 13(14) for children. With all reserve we think it may be supposed with a certain probability that 9, perhaps 10, of the adult coffins contained female or young corpses or were made for women, whereas the remaining 8 or 7 contained male corpses. Of 13 children's coffins (+ 1 incomplete one) the length and breadth showed that 11 of the coffins must have contained newly-born babies or quite young infants. 2 or 3 of the children can at most have been 2 or 3 months old, the dimensions of the remaining 8 or 9 coffins (abt. 50 cm. in length) were suited for newly-born babies. To this must be added two coffins of a suitable size for children of 2 years. With the necessary reservation these particulars of the dimensions of the coffins show that of 31 coffins 17 were adults or nearly so (7 or 8♂—10 or 9 ♀?), 14 children's coffins of which 11 were quite small, viz. 8 or 9 for newly-born babies, 2 or 3 for children of two or three months, 2 for children of abt. 2 years.

One of the coffins for newly-born babies was found standing on the top of the lid of an adult coffin which from its small dimensions was probably a woman's coffin. It is highly probably that this was a woman who died during or shortly after parturition and was accompained in the grave by her newly-born baby. From passages in the sagas[1]) it is, however, known that when the mother died it had to be considered whether milk could be procured for the infant or if it was necessary to kill the child to save it from death by starvation (a mode of proceeding common among the heathen Eskimos to this day).

There is nothing astonishing in these signs of a high death-rate among the infants. They are quite in accordance with the other particulars we possess of the state of health among the population at Herjolfsnes, and with what we can on the whole gather as regards the high death-rate among infants both during this period and much later.

It would of course be statistically absurd to employ the age-determinations found from the skeletons otherwise than for a purely discretionary estimate of the probable life time. But one thing is shown conclusively by this strikingly large number of quite young individuals, viz. that **half of this total of individuals above 18 years of age died before they reached the 30th year.** In present-day Denmark (e.g. in 1889—90) the probable life time remaining for men of 20 is 46.7 years and for women of 20, 49.4 years! It is a well-known fact, too, that the death-rate for women is on an average somewhat higher than for men just during the years of the development to puberty, and subsequent pregnancy and parturition, while otherwise the death-rate for men is higher than for women.

The short life time as well as all other signs thus point in the same direction. The race from Herjolfsnes was an enfeebled and degenerated race. The death-rate among newly-born infants was high, and of those individuals that got safely through the first years of life the majority had a prospect of dying at an early age before their growth was as yet quite completed.

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[1]) Gr. hist. Mindesmærker, vol. I—III.

Chapter IX.

Physical Constitution and Physical Defects.

Very characteristic is an arrangement of the material according to the diagnoses of the physical constitution.

Only about 5 individuals can we say: powerful (**V** ♂), fairly powerful (**I** ♀ especially the inferior extremities, and **XXV** ♂); fairly wellgrown (**VII** ♂), or fairly tall (**XI** ♂). Of these No. **I** ♀ was kypho-scoliotic with a deformed pelvis.

About 10 individuals we must say: slight, small, not powerful etc. viz. about Nos. **XIII**, **XVII** ♀, and **XVIII** ♂ which are designated as not well-grown; somewhat slender about No. **II** ♀ with rhachitis and a flat, deformed pelvis; small about No. **VI** ♀. No. **XII** ♀ has the upper part of the body and the arms slender; No. **XIX** ♀ is rather slender and has scoliosis; slender is further the designation for No. **XX** ♀ with rhachitis, cubitus valgus etc. Very small and slightly built are No. **X** ♀ and No. **XV** ♀; we note especially the small bones of the latter individual in the skeleton of the thorax, the pelvis, the extremities, e. g. the feet.

4 are young individuals or children.

About 6 individuals no details can be gathered, but most of them were at any rate not well-grown.

Of the total small number of individuals a striking number, viz. 6 women, had serious physical defects, deformities or other diseases, which could still be shown on examination of the skeletal remains.

Serious pelvic deformities thus occurred at any rate in No. **I** ♀ and No. **II** ♀. As shown the former had an asymmetrical pelvis, contracted in the lower aperture, while No. **II** had a markedly flat (and also somewhat asymmetrical-scoliotic) pelvis, taking its rise on a rhachitic basis, and scoliosis of the vertebral column. Woman No. **I** had at the same time a marked kypho-scoliosis connected with the pelvic deformity, probably also a tuberculous spondylitis of the vertebral column and some atrophy of the muscles of the left inferior extremity.

Scoliosis of the vertebral column (and thorax) was moreover shown in No. **XIX**. The very slender individual No. **X** ♀ had a pronounced atrophy of the left shoulder skeleton (and muscles), besides wry-neck (torticollis sin.).

The likewise very thin and slender young woman No. **XV** showed a strikingly feeble somatic constitution and had the left inferior extremity, femur and patella much thinner and smaller than the right. Perhaps a scoliosis (an infantile paralysis is less probable) has also in this case been contributory.

In individual No. **XX** plain symptoms of rhachitis were found, while the right inferior extremity (femur and patella) were weaker than the left. Of most interest, however, was the pronounced cubitus valgus deformity, almost, symmetrical of both elbow-joints, which was especially due to the changes in the position of the fore-arms in relation to the upper arms.

Moreover, all smaller deformities have not been considered here.

It is hardly an accidental circumstance, that **women** were here especially meet with.

On a brief survey of the above-mentioned facts we arrive at the following summary:—

Of 25 individuals **only 5** can be called either **powerful, fairly powerful, or fairly well-grown.**

About **6** individuals all we can learn is that most of them were **hardly well-grown.**

4 were children or quite young, at any rate not particularly well-developed judging by the remains.

Finally there are **10 individuals, of which 8 women,** who are designated as **not tall, small, slender, or very slight and weak.**

Among the **5** fairly powerful individuals the only woman was, however, markedly kypho-scoliotic (No. I) with a deformed pelvis.

Of the 8 small or slender women 5, viz. Nos. II, X, XV, XIX, and XX, **had blemishes or physical defects** of various kinds.

Compare also the summary given in chapter I, and chapters VII and XII.

Chapter X.

The Teeth and the Conditions of Nutrition.

Under the description of the separate individuals I—XXVI will be found a detailed description of the teeth and jaws and the state of wear of the teeth, and it is also mentioned what may be deduced in each case in regard to the intensity of mastication, and the food and its wearing quality. These descriptions should be compared with the contents of this chapter.

In **Tabula LXXI—LXXXIV** are found figures 205—255 of **the jaws and teeth** of the following individuals from **Herjolfsnes: Nos. II, X, XVII, XVIII, XX**. These cases were the most complete and best preserved, and important information has been gained from them.

For comparison we further, in **Tabula LXVIII** and **LXIX,** give **4 figures of normal masticatory surfaces** in particularly typically worn sets of teeth **from 2 Eskimo crania,** viz. a large and well-developed male cranium (age 30—35 years) with huge jaws and masticatory muscles, and a well-developed typical female cranium (age abt. 30—40 years) likewise with characteristic surfaces of wear in the teeth and powerful jaws and masticatory muscles. Both crania were found simultaneously in old graves from the neighbourhood of IVIGTUT in the southernmost part of the district of FREDERIKSHAAB, i. e. in a locality close to the northern boundary of the district of JULIANEHAAB in South Greenland, but of course the dental wear in several Eskimo crania from South, North, and East Greenland has also been compared.

As a very characteristic example of dental wear with various peculiarities we give, in **Tabula LXX, a medieval Danish cranium from the 13th century,** found at **Særslev** in Seeland. It originates from an adult male of abt. (55—)60 years of age, (the sutures of the cranium were occlosed). But this, too, is only meant to be a characteristic example of a Danish (North European) cranium from the Middle Ages.

4 accurately dated Danish medieval crania with highly characteristic and very differently developed dental wear in elderly people between 56 and 70 years old have been given by me in the photographic representations of the crania of King Svend Estridsøn (56 years), Queen Estrid (70 years or somewhat over), Bishop Vilhelm (60 years or somewhat over), and Bishop Asser (50—60 years); I may here again refer the reader to the descriptions in the text and the plates in my oft-cited work on the Royal and Episcopal Tombs at Roskilde. The series could of course be supplied with many others.

In 12 individuals (out of the 25 from Herjolfsnes-Ikigait) either the dental ranges or a greater or less number of teeth and jaws were preserved. It is chiefly the permanent teeth we shall have to do with.

Arranged according to age they appear in the following order:

Table 42. Individuals with the Teeth preserved.

1)	No. IV	child 11—12 years	7)	**No. X** ♀	25(—30) years
2)	No. XVI ♂	boy 15—16 years	8)	**No. XX** ♀	25(—30) years
3)	**No. VIII** ♂	boy 15—16 years	9)	**No. II** ♀	(25)—30 years
4)	No. XXI ♂	16—18 (20) years	10)	No. VII ♂	25—30 years
5)	**No. XVIII** ♂	22—25 years	11)	No. XXII	adult
6)	**No. XVII** ♀?	20—30 years	12)	No. V ♂	adult

The cases printed in heavy type are described in most detail.

Characteristic to them all, even the children and quite young people, is the unusual, even enormous wear of the permanent teeth, of which some already in early youth were worn down to half or one-third or one-fourth of the height of the crown in the case of early cut teeth. On a study of the above-given detailed descriptions we get a strong impression of this circumstance, compare thus case XVII and others. For greater lucidity I shall here give a brief summary of the periods when the individual teeth of the permanent set appear, and by comparing this with the degree of wear in the individual teeth, we shall obtain a good standard by which we can see to what a degree these individuals must have lived on food that wore down the teeth much in their childhood and youth.

The teeth in the permanent set, as we know, appear ("are cut") in a certain sequence, and the teeth in the lower jaw with one single exception a little before the corresponding teeth in the upper jaw.

Table 43. Dates for Eruption of the permanent Teeth.

I molar (dens molaris I)	is cut	abt. the	6th	year
I incisor (dens incisivus I)	—	—	7th	—
II incisor (— — II)	—	—	8th	—
I premolar (dens præmolaris I)	—	—	9th	—
II premolar (— — II)	—	—	10th	—

the canine (dens caninus)		is cut abt. the 11th year
II molar (dens molaris II)		— — 12(13)th—
IIImolar or wisdom tooth	dens molaris III or dens sapientiæ dens serotinus	— — 16th (17—21) year or still later, sometimes not at all.

From the 6th to the 12th (13th) year, i. e. for 6—7 years, until the second molar appears, the first molar will thus be particularly exposed to wear, while the incisors, premolars and canines will correspondingly for a longer or shorter time be exposed to extra wear. In the relative difference in wear shown by the I molar and the other teeth mentioned, in proportion to the wear on II molar which appears at the age of 12 (13), we have thus a certain criterion of the average intensity of dental wear during these 6 or 7 years, especially if we compare the wear in these teeth with the degree of wear in the II and III molars and with the age of the individual.

Now it is a well-known fact that dental wear may differ exceedingly in individuals of the same age, in some e. g. it is very great, in others moderate, or even very little pronounced. This of course is dependent on several circumstances, above all on the nature of the food, next on the manner of preparing the food and thus on the greater or smaller work of mastication required to triturate the food before it is swallowed, and finally on a very important factor in dental wear, viz. how many specially hard, wearing components the food contains. In this respect many different things which it would take us too far to enter upon here, might come under consideration, but of special importance is hard food such as hard-baked bread or fine hard mineral components either originating from the food itself, for instance silicious hard vegetable components (shells) or calcium compounds, silicic acid, and compounds or parts of the calcareous skeleton of marine animals or shells or mussels; or it may be admixed from without, for instance mineral dust or fine sand, found on the surface of vegetable substances blown on by the wind, or sand and earth from the soil, or particles of earth on plant roots; and here sand from quernstones or millstones is an important factor. By the grinding of corn or the trituration or preparation of many foodstuffs, especially from the vegetable kingdom, which contain tough or hard components that have to be triturated before the food is consumed raw or boiled, baked or in other ways prepared, with more primitive technical aids, hard mineral particles, very wearing to the teeth, will often be intermixed. Of course there is a great difference in the nature and amount of wear caused from these impurities. Fine grains of silex, sand, fine dust or fine particles from hard species of stone, granite, feldspar etc. will of course have a much greater effect on the enamel of the teeth — or, where this is worn away, on the exposed dentine — than softer dust from calciferous soil, calcareous rocks or clay. Here we have of course an infinitude of variations. But also intense mastication of hard tough vegetable matter or other tough food may have a great effect on the teeth, especially when a chemical effect from the components of the food or drink is added, or from the fluids of the mouth itself, or if substances are formed in the contents of the mouth by fermentation which have a chemical effect on the dental tissue. It would take us too far to mention here all the important factors which come into play here, but in regular normal mastication it is in a marked degree the mechanical wear of the teeth that bears a part, especially the hard components of the food, whether they belong to the food originally or have been intermixed from without, as in the case of dust or sand, or they become admixed with the food during preparation, especially trituration by grinding.

To this must be added the wear of the teeth on each other and the hardness and varying power of resistance of the dental substances themselves. These, too, may, as we know, vary considerably, and there is both an individual and a racial difference in the strength of the teeth. Thus many "uncivilised" races are distinguished by strong teeth, but also among many civilised peoples where a simple, suitable, and healthy diet is still the rule, we may find astonishingly sound teeth (though it is becoming rarer and rarer). On the whole we may take it for granted that where the jaws and teeth show very few actually morbid conditions, especially where there is no symptoms of caries or anything similar, this indicates a normal and good quality of the substance of the teeth in general.

It must then be strongly emphasised that there are virtually no symptoms of dental caries among the individuals at Herjolfsnes (Ikigait). In a few cases teeth have been lost, and in in a few cases it is seen that irritation has arisen in the tissue round the root and in the tissue of the gum (gingiva) or the jaw, round a single very much worn tooth, but this is exceptional. The teeth are certainly not very large, but both the teeth and jaws are as a rule good. It does not seem either that there have been scorbutic conditions (which, as we shall subsequently see, is explained by the nutrition conditions).

In addition to this wear of the teeth by the actual mastication of the food, there is, however, another sort of wear which may be an important factor, viz. where the teeth are extensively used for other purposes than mastication, or for work, as for instance when the Eskimos of Greenland use their teeth in preparing the skins. This is especially the case with the women who use mastication of the skins as part of the preparation process. Or the teeth may be used actually as implements to soften skin-ropes and skin-cords or clothing and articles of dress of skin, or to catch hold of implements or other objects as a kind of third hand, or in other ways (compare the descriptions of the working methods of the Eskimos). Also in the preparation of the food (or fermented drinks) mastication often enters both among the Eskimos and other "uncivilised" peoples as a preparatory process[1]) etc. All this involves extra wear of the strong teeth.

The typical pronounced wear of the dental ranges is very well seen in the figures of **the Eskimo jaws** in Tabula LXVIII and LXIX. The age of the man must have been abt. 30—35 years, that of the woman 30—40. Those of the man are excellent, magnificent teeth, those of the woman are also excellent though somewhat smaller. The regularly placed typical wear of the teeth, decreasing in intensity from I—III molar, is exceptionally well seen in the dental ranges of the man, and likewise how the incisors (as we have seen from their additional use as a kind of important working implements) are somewhat more worn than the I molar. In the woman, too, the dental ranges show regularly placed typical wear. There is a very suitable proportion between the degrees of wear in the I, II, and III molars, but it is somewhat greater than in the man and especially the front teeth are more worn, which is presumably due to the well-known mode of preparing the skins by regular chewing which especially the Eskimo women in Greenland employ. Both these Eskimo crania show excellent types of the splendid, powerful mastication apparatus (and enormous masticatory muscles) which the Greenland Eskimos are known to possess or at any rate to have possessed. Just these two have been shown as typical examples of the Eskimoic set of teeth to show the degree and appearance of the wear of the teeth in people who have lived in the same regions and subject to similar physical conditions in surrounding nature as the Norsemen in South Greenland, and who, in spite of being more advanced in age and using their teeth very intensely, show much less and more naturally graduated wear of the teeth than what we find even in the teeth of quite young individuals from Herjolfsnes (Ikigait).

The predominant amount of animal food consumed by the Eskimos cannot by itself cause this great wear of the teeth, for this, as we said, the teeth must be used as actual working implements, or the wear may be caused partly in consequence of the whole way of living, by the rather strong effect of sand and similar things admixed to the food, partly also by belabouring skins or skin implements that have been sullied with sand or dust (e. g. softening skin clothing or straps by mastication) etc. These special circumstances should be borne in mind when we proceed to the mention of the Norsemen's teeth in a little while.

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[1]) Not only in such primitive communities but also in other places did a preliminary mastication of the food in certain cases enter as a link in its preparation before it was served. Thus the preparatory chewing of hashed fish ("Plukfisk") e. g. in the Färoes is well known (cp. a well-known anecdote).

As an excellent example of the characteristic wearing down of the teeth in an elderly individual of at least 55 or 60 years of age, thus much older than the people from Herjolfsnes ever grew, we have the dental ranges of **the Danish medieval man from Særslev from the 13th century.** In the pictures of the teeth in tabula LXX may be seen certain deviations, of no importance in this connection, from normal symmetrical dental wear (the right side is perceptibly more worn than the left). There is, however, a characteristic and natural difference in the degree of wear in the I, II, and III molars (this latter for obvious reasons is not used as much as the two others), and likewise in the premolars, incisors, and canines, and yet the teeth in this somewhat elderly man are not nearly so much worn down (seen most plainly in the lower jaw) as those of the quite young individuals from Herjolfsnes. (This could be seen even more plainly in side and front views of the dental ranges in the Eskimo crania and that of the man from Særslev, but for obvious reasons we must desist from giving too many figures). The medieval man from Særslev has no doubt used his teeth well and vigorously, the great wear must no doubt be due to hard food and the accidental admixture of fine sand, dust, or similar hard mineral components in his food (in bread, e. g. from the quernstones).

Finally I shall mention from my book on the Tombs at Roskilde how the teeth of the royal personages were less worn in spite of their age (Estrid was over 70, Svend Estridsøn 56). They of course lived on better and finer food. Estrid's were least worn. As a lady of rank she could evidently better choose her own food, while King Svend was no doubt more obliged to rough it during the stirring times of his reign, during his campaigns and on journeys. The teeth of the bishops were, characteristically enough, rather worn, at which we cannot wonder, at any rate in a man like the austere Bishop Vilhelm who was evidently somewhat ascetically inclined. Two other examples may be added to this, viz. the crania, likewise dealt with in my book above referred to on the Tombs at Roskilde (1914), of Sophia, queen of Valdemar I, d. aged 58 with excellent, quite well-preserved teeth only slightly worn, and of Berengaria, queen of Valdemar II, d. aged 29 with magnificent, completely preserved dental ranges only very slightly worn.

All the examples here adduced of crania both from Denmark in the Middle Ages and from the Eskimos living in the same part of Greenland as the people from Herjolfsnes (Ikigait) show quite plainly on comparison of the dental wear to what intense wear the teeth of the inhabitants of Herjolfsnes must have been subjected during long periods.

Table 44. A brief survey of the state of the teeth in all the 12 individuals from Herjolfsnes will give a more complete picture.

1) Skeleton IV. Child, 11—12 years. Great wear of the teeth. In the front teeth two-thirds of the crown are worn away, great wear of the canine. Molar II, the 12 years' molar not worn. The food must have been very wearing to the teeth.

2) Skeleton XVI. Boy, 15—16 years. Well-marked wear, but molar II only little worn.

3) **Skeleton VIII.** Boy 15—16 years. Great wear of the teeth, I molar (the 6 years' molar) much worn, similarly the premolars, II molar both in the upper and lower jaw shows small facets of wear though only in use for a short time, III molar has the crown entirely without wear and this tooth was not entirely cut when death occurred. The food must have been very wearing to the teeth.

4) Skeleton XXI. Boy, 16(—20) years. I molar rather worn, III molar not worn. (The food has in this case been somewhat better than in the other cases).

5) **Skeleton XVIII.** Young man, 22—25 years. Very great wear of the teeth in proportion to the age. The wear is very similar to the finding in skeleton XVII. The food must have been unusually wearing to the teeth.

Figures of jaws and teeth in **Tabula LXXIX and LXXX.**

6) **Skeleton XVII.** Young adult individual, probably a woman between 20 and 30 years of age. There is extraordinarily great wear of the teeth. Barely one-fourth—one-third of the crown of the I molar is left on the left side, and posteriorly the wear goes right down to collum dentis. There is also great wear of the (incisors) premolars, and canines. The cusps are worn down, and in several teeth secondary dentine is seen. The II molar is much worn, the III molar less. Round some teeth there has been some irritation of the osseous tissue of the jaw, probably owing to the great wear of the teeth. The dental cavity is nowhere open. Compare also the preceding detailed description.

During the time from the 6th to the 12—13th year the teeth of this individual must have been subjected to enormous wear, and also after that time if we consider the great wear in the II molar especially in proportion to the age. The food must have been in a corresponding degree enormously wearing to the teeth (see remarks in the detailed description). Figures of jaws and teeth in **Tabula LXXV—LXXVIII.**

7) **Skeleton X.** Young woman, abt. 25(—30) years. I molars very much worn, also the premolars and canines. II molars much worn, but less than the others. The III molars of the upper jaw have not been in contact with those of the lower jaw which only show facets of wear for the II molar in the upper jaw. No caries. Food very wearing to the teeth.

Figures of jaws and teeth in **Tabula LXXII—LXXIV.**

8) **Skeleton XX,** young adult woman, abt. 25(—30) years of age. The I molar is very much worn down, in the premolars and canines half the crown is worn away, the II molar shows fairly great wear, but the III molar comparatively little wear. All other teeth show great wear, the dentine is specially dense on the surfaces of wear. Secondary dentine closes the dental cavities on the surfaces of wear. No caries, no signs of scorbut. The individual must have had to use her teeth to an unusual degree from childhood, and the food must have been very wearing to the teeth.

Figures of the jaws and teeth in **Tabula LXXXI—LXXXIV.**

9) **Skeleton II.** Young adult woman, (25—)30 years of age. The teeth show great wear. The I molar worn down to barely half the height of the crown. There is much wear of the incisors, canines, and premolars. Also the II molar shows considerable wear. The III molars had not appeared. The dentine exposed. No caries.

Figures of the jaws and teeth in **Tabula LXXI.**

10) Skeleton VII. Young adult male, 25—30 years. Canines much worn. Dentine exposed. 2 crowns of molar III in the lower jaw only show facets of wear for the II molar in the upper jaw. The wisdom teeth of the upper jaw have either been absent or not in contact.

11) Skeleton XXII. Incisor teeth rather worn.

12) Skeleton V. Adult male, powerful. 3 much worn molars and 2 premolars from the lower jaw are found. On the masticatory surface the dentine is exposed.

From the preceding brief survey of the dental wear and conditions in the 12 skeletons from Herjolfsnes (Ikigait) the following will appear:—

The jaws and teeth have as a rule been good and rather powerful though not very large. The wisdomteeth have as a rule been small and often not in contact with each other, or else entirely absent. There is no sign of caries in any of the teeth. Quite rarely there have been signs of irritation of the tissue round some of the teeth — no doubt in consequence of great mechanical wear. Now and then a tooth has been lost during life from some cause and the alveolus is closed. Anomalies in the position of the teeth and in the articulation of the teeth occur, but rarely and they are as a rule not very pronounced. On the medial sides of some of the lower jaws there is a strengthening of the osseous mass of the jaw in the shape of a **torus mandibularis**[1] (about this see under case XVII). Asymmetry in the use of the right and left half of the jaw is frequent, but rarely reaches considerable degrees. The jaws are often asymmetrical partly in connection with cranial asymmetry, in case X with torticollis. — See preceding part.

All the 12 individuals whose teeth and dental wear could be studied were children or young people up to 30 years of age. Characteristic to them all is as a rule unusually great wear of the teeth of the permanent set, thus both in childhood from the age of 6 to 12—13 years and later.

In contrast to the differently graduated dental wear usually occurring both in recent crania and those of the above-mentioned medieval Europeans, and especially, too, in contrast to the otherwise great dental wear in Eskimo crania, the dental wear in the skeletons from Herjolfsnes (Ikigait) is distinguished by unusual intensity in those teeth, I molar, incisors, premolars, and canines which gradually supersede the deciduous teeth at the age from 6 to 12—13 years. These teeth will thus be subject to extra heavy wear, and when the II molar appear this tooth will certainly as a rule be much worn, too, but partly the food has evidently layered itself especially between the I molar and the premolars during mastication, partly these teeth will already at the age of 12—13 have lost considerably in resistance, and have been deprived of an essential part of their enamel cuspides on the crowns, so that the wear in these early and intensively used teeth relatively quickly reaches the dentine which is considerably less resistent to mechanical wear than the hard protective enamel. The consequence will of course be that where the enamel is worn away the surface of the crown will be hollowed out more quickly in the exposed dentine than in the parts protected by enamel (as will easily be seen in our pictures of the masticatory surfaces). Even if now the dentine, as observed in the crania from Herjolfsnes, reacts against this wear by a condensation and strengthening of the dentine area of the masticatory surface, this will in the long run be insufficient in the case of food that is very wearing to the teeth. The enamel once gone, such teeth are quickly worn down when they are used so much as they evidently were at Herjolfsnes. The II molar which is cut in the 12th—13th year has, however, its fresh, thick coating of enamel to resist the great wear, which therefore shows its effects relatively later in the II molar where the wear is continued on hard enamel, while the wear in the previously erupted teeth will take place to a large extent on the dentine surfaces. Hence even if the II molar in these young individuals between 20—30 years is worn down unusually low, the I molar and the incisors, premolars and canines, owing to the abovementioned reasons, have got an unusually large start in wear, and this relative difference will increase so long until the enamel coating of the II molar is worn away, too. In cases XVII, XVIII, and XX these conditions are well exemplified.

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[1] On torus mandibularis cp. C. M. Fürst and Fr. C. C. Hansen: Crania Groenlandica, Copenhagen 1915, p. 178 ff.

The III molar has rarely had time to get much worn before the death of the individual in question, for partly it does not normally take such a great part in mastication as the other teeth as long as these other teeth are present, partly it was not a rare occurrence that the wisdomteeth were absent or had not been in contact with each other. And the wisdomteeth, as we know, are the teeth we can best do without. It will be clear, too, that the wear even in a hard working II molar cannot be proportionally as great as in the others, as it is assisted and thus partly freed from work during mastication by the previously cut teeth anterior to it. That the I molar is particularly burdened with work will be understood by everybody. It is seen, too, that this tooth is almost entirely worn away in some crania, especially in the lower jaw. The explanation of this difference between molars I in the lower and upper jaws is, that the I molar in the lower jaw comes more quickly into full work with the II deciduous molar (and later on with its successor the II premolar in the upper jaw) and with the anterior part of the I permanent molar in the upper jaw. The posterior cusps of this tooth (molar I) in the upper jaw do not come into articulation with the anterior cusps of the II molar in the lower jaw until this latter tooth appears at the age of 12—13.

In those teeth where the cusps are worn away and the enamel thus more or less gone, the masticatory surface will little by little be so much worn down that it would long since have opened cavum dentis, the pulp cavity with the soft tissue, vessels, and nerves of the tooth, if the tooth did not possess a natural protective power against the dangerous and painful opening of the pulp cavity. The regular mastication work and much wear on the crown of the tooth will act as a stimulant to the pulp of the tooth, so that new layers of dentine are formed on the internal surface of the dental cavity, by which the dentine substance is thickened from the interior and the pulp cavity is gradually reduced and so disappears — is closed — upwards towards the masticatory surface. So the pulp cavity is never opened, though the surface of wear has perhaps gone far below the level to which the pulp cavity originally extended within the crown of the tooth.

In none of the teeth of the crania from Herjolfsnes (Ikigait) had the pulp cavity been opened even if the crown had in many teeth been worn down very low, even right down to collum dentis. The original contour of the pulp cavity could in these teeth be observed to be closed by a very effective natural "stopping" — formed from the dental pulp — of secondary dentine. This latter is easily distinguished from the original dentine by its appearance and its structure. In all dental ranges with great natural dental wear the presence of secondary dentine may be observed. Compare also the figure of the teeth in the Særslev cranium, tabula LXX.

No sign of the loss of teeth in consequence of scorbut was found. And as a rule the population could get fresh vegetable food such as "Kvannen", (angelica archangelica) or the old antiscorbutic remedy "cochlearia" (scurvy-grass) which grows very extensively just in these regions. But there is also abundance of **the animal antiscorbutica**[1]), especially the excellent remedy "**mattak**". This is the skin of the narwhale, monodon monoceros, and of the delphinapterus leucas. **Boiled liver of seal** is also a good remedy. That the diet is an important factor just in scorbut is a well-known fact. This disease, as we know, is an avitaminosis, which is particularly liable to occur when the diet grows too monotonous, e. g. if an exclusive fish diet, even though fresh, (cod, halibut) is followed for a long time (known from Newfoundland fishermen), or the diet consists exclusively of dried or salted or otherwise preserved food.

This unusually intense dental wear, shown here for the first time at an early age in the children and all the young individuals of Herjolfsnes, of whom the jaws and teeth were preserved, now permits us to draw certain definite conclusions concerning **the nature of the diet** of the Norsemen at Herjolfsnes (Ikigait). If we compare this unusual dental wear among the Norsemen with the circumstance that Eskimos who have lived in the same parts of Greenland show relatively less intensive and more normally graduated dental wear, we may draw the **conclusion** that **greater amounts of a much more wearing nature of food must have entered into the diet of the Norsemen than if we imagine that they lived predominantly on animal food like the Eskimos.** Animal food, even if treated in the very little cleanly manner, according to our notions, which the Eskimos adopt, cannot of course in the nature of the case cause so much wear, unless there is a constant addition of impurities from without, such as sand, dust, or other hard mineral components which may cause vigorous mechanical wear to the hard tissues of the teeth. This must also be the case according to the whole Eskimoic way of living, and in addition they also, as stated above, make great use of their teeth as implements (besides for mastication). Nevertheless dental wear in the 2 Eskimo crania is less in these individuals, though they were older, than in the adult individuals from Herjolfsnes. Also comparison with the Danish medieval crania shows much less dental wear comparatively for these. And it is particularly the whole nature and great intensity already in childhood and youth of the dental wear that is so striking in the individuals from Herjolfsnes (Ikigait). There is hardly any reason to suppose that the Norsemen in Greenland should have dirtied the fresh animal food to which they had access more than the Eskimos — it is much more likely that the preparation and preservation of the food was quite similar to that which was customary in Iceland, Norway (or otherway in the northern Europe), only adapted in accordance with the produce and physical conditions of Greenland. On this subject I refer the reader to the description in Daniel Bruun's latest works¹) on the Icelandic Colonization of Greenland, and for the Greenland of our day to the great repertory work on Greenland, published by the Greenland Commission in 1921, the 2nd centenary of the Danish colonisation of Greenland after the landing of Hans Egede²).

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[1]) See Alfr. Bertelsen: Animalske Antiscorbutica i Grønland, Hospitalstidende No. 20, Copenhagen 1911.

In the 1st volume of this work there is an excellent general description by R. Hammer of the physical conditions, people, history, etc. of Greenland, in addition to special descriptions by several other authors.

Cp. also the excellent standard work of H. Rink: Grönland I—II Copenhagen 1857.³)

R. Müller: Vildtet og Jagten i Sydgrönland, Copenhagen 1906, contains much information on the hunting and wild animals in Greenland.

We must therefore look for other causes for this remarkable dental wear, and the thought will naturally suggest itself that these individuals from Herjolfsnes must have been forced, to a greater

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¹) Daniel Bruun: Erik den Røde og Nordbokolonierne i Grønland, Copenhagen 1915. — Daniel Bruun: The Icelandic Colonization of Greenland and the Finding of Vinland. "Meddelelser om Grønland", vol. LVII, Copenhagen 1918.

²) Grønland i Tohundredaaret for Hans Egedes Landing. 1921. "Meddelelser om Grønland", vol. LX and LXI. 2 volumes with maps.

³) The reader is further referred to the extensive list of literature in Crania Groenlandica, Sect. I l. c. and in Fr. C. C. Hansen: Outlines of the Geography and History of Greenland, Copenhagen 1915.

extent than has hitherto been supposed, to subsist on another and poorer kind of food than what we have been led to think of from the accounts in the sagas, which by the way are very scant. We shall therefore quite briefly 1) enumerate the articles of food which may in general be supposed to have constituted the diet and thereupon 2) examine what other, poorer foodstuffs the physical conditions of Greenland gave access to when there was a year of scarcity, and the first articles failed either partly or completely, or when there were periods of shortage of food.

It is well known from the historical records that the Norsemen in Greenland on the whole tried to carry through a way of living similar to that practised in the mother country, Iceland, in so far as circumstances would permit it. Moreover the excavations of Gustav Holm, Daniel Bruun, Clemmensen, Stephensen, Birket Smith and others in the Norse settlements, of the ruins of houses, farms, storehouses, and outhouses, show that the breeding of farm animals was of the greatest importance. There were (at Herjolfsnes, too) cows, sheep, goats, and all the stabling, barns, cattle pens, and enclosures appertaining. Horses, dogs, and cats were also kept (the skin of the latter animal is mentioned used for some few articles of clothing). In addition to the dairy produce the meat and fat of the cattle (especially perhaps mutton) fresh or preserved, e. g. dried in a certain way, were important. Besides cattle-breeding on as large a scale as circumstances (grazing and haymaking) would admit of, the hunting of land and marine mammals was of course an important occupation besides wild-fowling, egg-collecting and fishing. In this respect the investigation of the refuse-heaps (kitchen-middens) of the excavated Norse farms has furnished important information. The late zoologist Herluf Winge (Inspector of the Zoological Museum of Copenhagen) was thus able to determine a number of bones of animals from the refuse heaps, thus showing that they contained numerous bones of seals, in the first place of the Greenland seal or harp seal (phoca groenlandica), and also bones of oxen, sheep, and goats. There were also bones of other Greenlandish mammals, such as the polar bear, the arctic fox, the reindeer, (but not of hares), further of other species of seals such as the beard seal (phoca barbata), the common fiord seal (phoca foetida), the hooded or bladder-nose seal (cystophora cristata) and phoca vitulina.

Walrus (Trichechus rosmarus) and whale were also hunted.

The milk not only of cows but also of sheep and goats was used. Much butter and cheese were made. In such cold climates as Iceland and Greenland the butter was kept long, often for years. When the whey had been pressed out the firm butter could keep long without going bad, it then underwent a certain process of fermentation by which it became soured, or "strong" as it is called in Iceland. Often large stores of this old butter were collected; it was preferred to fresh butter and if carefully attended to, it could keep very long, up to 20 years or more. In earlier times it was, at any rate in Iceland a very important article of food, and was eaten with dried fish instead of bread. Butter was also an important trade article and means of payment, taxes and dues were partly paid in butter. We may no doubt safely take it for granted that the same was the case in Greenland. In a passage in one of the sagas it is thus mentioned that on a certain occasion 60 carcases of slaughtered cattle, abt. 960 pounds of butter, and a large quantity of dried fish were found stored away in an earth house (underground storage room). Cheese is also mentioned in some passages. It has been both old cheese with a hard rind, and the soft fresh cheese "Skyr" made like "junket" of sour milk. Soft cheese was a most common dish either fresh or boiled with milk or cream. Besides being used as drinks, fresh and sour milk, buttermilk and whey were no doubt much in demand, as in Iceland where a sour whey, fermented in a certain manner, was also used as a preservative — instead of salting meat it was "pickled" in this sour whey.

In speculum regale, the "King's Mirror", a great deal of important information concerning the physical conditions, natural resources, produce, and population of Greenland is given in the shape of a series of questions and answers passing between a father and son. In regard to the nutrients it is emphasised that of cereals the country only produces little. "Yet there are men who are mentioned as the most prominent and powerful who try to sow for the sake of experiment, but the majority in that country do not know what bread is and have never yet seen bread". To the subsequent enquiry what the people in Greenland then live on, the answer is: "But you wish to know what people live on in that country since they grow no corn, then man lives not by bread alone; it is said that in Greenland there are good pastures, and there are large and good farms, for people keep a lot of cattle and sheep, so that much butter and cheese are made; the people live in great part on that, and also on meat and all sorts of produce of the hunt, such as the meat of reindeer, whales, seals, and bears. In this way the people of the country subsist".

An article of food mentioned now and again is "Grød" (porridge); it is mentioned that porridge was made in kettles; in a single place flour is mentioned which people lived on, as also on seals when their cattle had perished. In one passage porridge cooked with goat's milk is espressly mentioned; it was served to a sybil (vølve), who was also served with the hearts of all the animals that could be obtained. In another passage we are told that the meat of seals was cooked in a kettle etc. Otherwise, as a general rule, food, meals, or cooking are only mentioned little or not at all in the historical records. The interest centred in people, their talk, tales, exploits, fights, travelling and strange adventures, fortunes etc. But the diet or cooking is as a rule only mentioned in a few cases or when there is a special abundance or dearth. Raw, uncooked, or otherwise unprepared food was hardly very common. Thus it says in a certain passage that it was difficult to procure fuel to make a fire under the kettle, and the men did not like to eat the food raw. Later on in the same tale (Fostbrødre Saga) it says: "Thorgeir answered: It was necessary for you to prepare the food, raw food is forbidden by the laws of the land[1]), and my lord King Olaf also forbids all his men to eat raw food" (in distinction from the heathen custom).

It is also mentioned that on fast-days it was forbidden to eat the meat of such "fishes" as walrus or other seals, while true whales and other genuine fishes could be eaten on fast-days.

As regards drinks we have already mentioned milk and milk products (besides water of course) but the popular beer could not be brewed as they lacked corn and malt; nor had they of course any mead. Whether they could use plant-juices as drinks, as in other places and in the North the sacchariferous plant-juices, e. g. the sap of the birch tree, is uncertain. As an example we quote the following passage by Peder Claussøn Friis[2]), referring to Norway: "In the spring in April the bark (of the birch tree) is full of sap and water, so that people cut or pierce the bark, then sweet (tasting) water runs out, in some trees sweeter than in others, barrels full out of one tree, in the course of a week or a fortnight, until the leaves come out, then it stops. This water is drunk by shepherds and woodmen . . . also by wanderers". "Some people also make porridge of it with groats or flour, and it tastes nice. It is also used as a remedy for stone and jaundice". Wine, on the other hand, is expressly mentioned (in Bishop Paul's saga), prepared of black crowberries (Krækkebær), the fruit of empetrum nigrum, amongst other things as a substitute for wine for the Holy Communion: „In the time of Bishop Paul, Bishop Jon came from Greenland to Iceland (Skalholt). Bishop Jon taught people how to prepare the wine of black crowberries according to the recipe given him by King Sverre in Norway. But it happened that next summer there was a failure of crowberries in Iceland. A man named Eric, living on a farm called Snorrastad a short distance from Skalholt, had, however, some wine (made of crowberries) which turned out good that summer". This was no doubt an ancient custom. We know from the investigations of Professor BILLE GRAM (Copenhagen) that the preparation of fermented drinks from berries was customary already in prehistoric times in Denmark.

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[1]) An allusion probably to Bishop Grimkel's "Christian Law", or to the laws given by Olaf the Saint (abt. 1015) for Norway which he also caused to be introduced into Iceland (Grønlands historiske Mindesmærker II).

[2]) "Om Diur, Fiske, Fugle og Træer udi Norge" (1599), collected works edited by Gustav Storm, Christiania 1881.

Information concerning the food is, as we said, scant and quite fragmentary in the historical records proper, but from this we cannot, as is well-known, draw any conclusions; very often at other times, as will easily be understood, it is just this sort of information concerning the most commonplace occurrences or conditions of daily life which is absent from the historical records, where the interest generally centres in quite other things, and information must then be sought from other sources (the direct archæological investigations very often furnish abundant material for our knowledge of daily life). Or information must be sought in topographical writings, natural histories, books of travel, on economy etc. It is of course quite outside the scope of the present treatise to give special researches in this respect concerning food and drink beyond what was already easily accessible in the most obvious sources, and in this connection I shall therefore point out how some quite temporary random examples of the frequent or occasional employment of the products of various plants as nourishment, partly as substitutes for or supplements to the animal food predominantly, as we showed above, taken by the Norsemen in Greenland under normal conditions, may easily be supplemented by a series of plants¹) which may not only be supposed to have been used, but must actually be considered to have been employed occasionally e. g. in years of scarcity or in difficult times, not to mention actual famine periods, as food at any rate by the poorer people of the Norse colonies in Greenland, — and in such times people who were before very wealthy could swiftly be reduced to poverty when their cattle, their chief source of wealth, died from various causes, failure of the grass, epidemic diseases, cattle-plague, etc. and the hunting

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¹) Of course some few animal food stuffs may also have been used, such as mussels, which did not in normal circumstances constitute any important ingredient in the daily fare. Cp. also the above-mentioned important work of RINK (1857). Besides various botanical works consulted, much information is found in "Meddelelser om Grønland", cp. also e. g. J. W. HORNEMANN: Dansk oeconomisk Plantelære I—II, Kjøbenhavn 1821—37 and others.

and fishing failed at the same time. If thus we examine what could occasionally be used of edible plants and products of plants in Iceland in former days, thus e. g. on E. Olafsen's and Bj. Povelsen's Journey through Iceland I—II, Sorø 1772, (undertaken at the instance of the Danish Royal Society of Sciences), we shall find, besides the familiar information about the commonly used articles of food in the various parts of the country, a striking number of products or parts of various plants which were used either locally or more generally as food not only for animals but often for human beings, too, at any rate in periods of distress. There can hardly be any doubt that there are among them articles of food known and used from very ancient times. Even if they were not equally popular in normal circumstances, they might be used either to a small extent and occasionally, or in an emergency, or in years of scarcity or in the absence of nutrients they might be used to a greater extent to support life.

From other places in the North, Norway¹), Denmark²), Sweden³) we know for instance of barkmeal and barkbread both from the bark of firtrees and especially from that of elmtrees, used in certain parts of the country during the frequent failure of the crops, and perhaps a simultaneous failure of the fishing, death of the cattle etc. Other admixtures are also mentioned. (The "great war" as we know brought these old succedanea into use again ("Brotstreckung") in places where they had not been thought of for hundreds of years).

It is hardly quite unreasonable in certain respects to analogise conditions in olden times in Iceland or certain parts of Norway with corresponding nutrition conditions in the southern parts of the Norse colonies in Greenland, if we consider the connection between the countries kept up for centuries and that adherance to traditional forms of life necessitated by the restrictions imposed partly by physical conditions in the provision of the simplest necessities of life. I therefore find it very natural to assume a greater consumption also of vegetable food in times when there was a scarcity of many animal foods, and then often just such vegetable foods as

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¹) See thus on the use of bark in Folden Fiord (Numedal's Lehns Beskrivelse 1597), about Sævig, about Overhald's parish Kgl. norske Videnskabernes Selskabs Skr. 1817, p. 437—440.

Peder Claussøn Friis l. c.

E. Pontoppidan: Versuch einer natürlichen Historie von Norwegen I—II, Copenhagen 1753—54.

²) In Denmark (1699) common people mixed hay and heather seed in barley bread and buckwheat bread during a bad failure of the crops.

³) During the great famine in Sweden in 1446 people had to eat bread containing an admixture of bark-meal. The king, Christopher of Bavaria, was therefore nicknamed the bark-king. Cp. also Finland.

required more trituration for instance by means of the quern stones which have been discovered, and which were not in any degree worth mentioning used for grinding corn, which was either lacking or if it was occasionally imported then only in smaller quantities with which the diet could not be supplemented in case of a serious shortage of the usual animal foods. As we have said once before in this chapter such vegetable food could easily be covered with fine mineral particles, dust, sand, etc. in nature, even if such substances were not added during a process of crushing or grinding.

The great dental wear found in the individuals from Herjolfsnes must be explained exactly by the assumption that at any rate during long periods of the later years of the settlement the previously abundant animal food had to be supplemented from the vegetable kingdom, when cattle, cows, sheep, goats, perhaps became much reduced in number and when the hunting of land or marine animals was reduced (by ice obstacles, the absence of boats or other implements) or in periods became too incidental or insufficient, just as in our day famine may or might occur among the Eskimos with the result that whole settlements die out.

That the historical records say nothing directly about this means very little in that respect[1]). Hunger will, as experience proves, force even the daintiest people to seek satiation in all sorts of edible things otherwise despised. This has always been the case, and the great periods of famine during and after the great war have again abundantly and distressingly confirmed it. We must not let ourselves be led astray by the apparent, but perhaps only partial wealth of frieze cloth made of sheep's wool. Such frieze is very strong and may be very durable when it is repaired as we see from these very clothes from Herjolfsnes, and a regard for the supply of wool rendered it necessary to be economical in killing sheep out of the perhaps scanty stock, and finally it is a well-known fact that in many places the sheep were not sheared in the Middle Ages, but the wool was pulled off by which chiefly the older, looser, rootless hairs came off, while the hairs that had a papilla adhered more firmly to the skin. It was no doubt a more suitable method just in cold regions like Greenland, instead of exposing the sheared sheep to the cold and vagaries of the climate. In Iceland the sheep were not sheared but at the close of May the animals cast the whole of the old coat which can then be taken off in an entire layer, underneath the skin is then covered with the fresh short hairs. Such sheep with their new short coat often suffer much from the cold in spring if it lasts long, and the shepherds protected weaker sheep by tying pieces of frieze over them. Compare herewith the proverb "God tempers the wind to the shorn lamb".

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[1]) The fact that the authors and sources do not mention certain things or facts should not be considered conclusive as is not always remembered. ALEXANDER v. HUMBOLDT e. g. mentions three important facts which cannot be denied but which nevertheless are not mentioned or evidenced exactly in those sources where we should most of all expect to find them mentioned: In the archives of Barcelona there is no allusion to the triumphal entry COLUMBUS made into this city; in MARCO POLO the Chinese wall is not mentioned at all; and in the archives of Portugal there is nothing about the voyages made by AMERIGO VESPUCCI in the service of this kingdom (Gesch. d. Geographie d. neuen Kontinents IV. th.).

It will be understood that such conditions might lead to a greater use of food stuffs from the vegetable kingdom — and even then there have quite evidently been long periods of chronic undernourishment. This may with great probability be inferred from the general and conspicuous great reduction of stature, physical proportions (and body weight) — in short, exactly the same symptoms which manifested themselves so unmistakably during the hunger blockade in Germany, Austria, and many other places[1]). The enormous wear of the teeth even in children and quite young people which we found constantly among the inhabitants of Herjolfsnes from the more recent periods corroborates just those signs of chronic or at any rate periodical undernourishment, perhaps bad or inferior nutrition conditions, and now and again perhaps actual starvation periods, **of which the deterioration in somatic constitution and the short lifetime of the individuals spoke so plainly** — in contrast to the vigorous settlers of the previous centuries.

Then **what nutritious plants** are found ashore or in the sea round Herjolfsnes and the adjacent localities that might with some probability be supposed to enter into the diet of a population which was somewhat scantily rationed by the physical conditions?

Besides consulting the sections in question in "Meddelelser om Grønland" and the above-mentioned works of Rink and others for the plant-world, I have enquired of Professor L. Kolderup Rosenvinge, the Copenhagen botanist, who is particularly well acquainted with the vegetation in these parts of Greenland and who readily furnished me with certain information of great interest about specially edible plants which not only may be employed, but are in fact in many places employed as food for men (and animals).

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[1]) Cp. on undernourishment and its consequences during the great war among other works, A. Loevy: Unterernährung, Ergebnisse der Medizin, vol. II, 1921.

Of plants with edible berries the following are found in great number: vaccinium, thus bilberries, vaccinium uliginosum, march-whortleberries, and empetrum nigrum, also called crowberry (Krækkebær). Of a crassularia, rhodiola rosea, the rhizoma is edible. "Kvannen", angelica archangelica, which may reach the height of a man, is very common just at Herjolfsnes and was (and is) a very popular article of food and one of the few plants which is specially mentioned by the Norsemen; the Icelanders had special "kvanne"-gardens. In fertilised places near the old farms grows taraxacum, dandelion; too this plant is eaten in many places, for instance as a salad in France where its popular name is "pisse en lit", but it was not eaten by the Icelanders. As mentioned above, cochlearia is found (used also as a very fattening animal fodder, which, however, gave the meat an unpleasant taste).

Of bushes and trees, the leaves and bark of which could be used as animal fodder when there was a scarcity of grass are found the alder, alnus ovata, in the interior of the fiords, also in great number the willow, in copses of salix groenlandica and salix glauca. These copses are a favourite locality for angelica archangelica. Birches, betula, mostly in copses, are common, thus betula pubescens, betula nana, and betula glandulosa. (We have previously mentioned the sap from the birches).

Further we find the mountain ash, sorbus americana.

Of edible lichens we shall mention cetraria islandica (containing oxalate of lime), it is found very abundantly and mixed with mosses and is, as we know, eaten in Iceland (as a pulp) by the common people (also called Icelandic moss). In Greenland the cetraria — as mentioned by Rink (loc. cit. vol. II p. 155—157) — may be utilised when previously dried and ground and with a decoction of fish meat baked as bread. Thus prepared this bread has retained but very little of the acrid taste. Also lichen Carraghen may be utilised. Reindeer lichen, cladonia rangiferina, which is eaten by the reindeer, is found in many places. (As it will be known it is used in some places in the manufacture of spirits).

Very common in Norway and on the rocks along the coasts of the Norwegian countries, also along the coasts of Greenland is "tripe de roche", umbellicaria or gyrophora esculenta. These are large lichens fastened to the rocks, with a navil in the middle. They are eaten in Japan amongst other places, and have been eaten on polar expeditions.

Of edible sea-weeds we note laminaria alaris, containing mannite and pectine substances which swell very much in water. Of edible rhodymeniaceæ, rhodymenia palmata is common along the coasts of northern Europe and is eaten by men or sheep.

Seaweeds and mussels are eaten by the Eskimos in times of scarcity.

If we review the uses to which a whole series of these plants and others were put to e. g. in Iceland in former times — see thus the work previously mentioned on Olaffson's and Povelsen's journey — we shall be struck by the number of plants which were commonly or occasionally used as food for men and animals, at any rate when the usual nutrients failed.

As said before we cannot wonder that information concerning such facts is quite lacking in the historical records but this need not mean that they were not known. For we are here dealing with the outcome of ancient experience, gleaned by the people in the course of time and which has often been noted down late and accidentally, oral tradition being sufficient in daily life and housekeeping, through centuries or rather through millennia, in relation to a number of things and particulars concerning daily life and the gaining of one's livelihood.

That it was no doubt largely the women who particularly preserved and propagated the tradition about the house, the of interests housekeeping and cooking, must be taken for granted, and the knowledge of herbs under which falls the knowledge of remedies and medicinal herbs and the treatment of the sick was very commonly in the main attended to by the women among the Norsemen in olden days. Of course it was also sometimes in the charge of men, for instance, Snorre the Priest, the famous chieftain in Iceland, and the skill in the medical art of some kings is mentioned, thus of Olaf the Saint, Magnus the Good, and Sverre¹).

I therefore suppose that such edible foodstuffs from the vegetable kingdom (and partly from the animal kingdom) as the above-mentioned, though used more rarely in times of plenty, were more commonly used

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¹) In the case of King Sverre it is probable that he, who had previously been ordained and was thus a "scholar", also had some knowledge of medicine and amongst other things of medicinal herbs. In the case of Olaf the Saint and his son Magnus the Good it was perhaps mainly by their piety that they effected cures, but there is the possibility that in popular belief a special gift of curing certain diseases was often associated with the royal dignity. This belief goes far back into time and persisted even up to the most recent times; well-known is especially the privilege of the French kings to cure scrofulous glands by their touch — "le toucher royale". As late as the 19th century Charles X performed this ceremony with the words: "Le Roi te touche, Dieu te guérisse" (instead of the previous: "Dieu te guérit!"). The English kings had a similar healing power since Edward the Confessor's time and used it often; thus in the course of 15 years Charles II administered the "royal touch" in 67000 cases of scrofula of the glands which from olden times bore the name of the "King's Evil".

in more recent times or during periods of scarcity or want — see above. The deterioration of the climate (see Dr. Nörlund's "Buried Norsemen") a higher death-rate among the farm animals, a decrease in the yield of hunting and fishing from several different causes (ice conditions), most probably also competition with the invading Eskimos have **combined with the decline of the vitality of the population from other causes to form a circulus vitiosus finally involving the extinction of the Norse colonies,** the thus enfeebled population not being able to resist the competition of the Eskimos in the struggle for the necessities of life and succumbing more rapidly than if the Eskimoic onrush had not come.

Chapter XI.

Microscopic Investigations.

As we mentioned under the detailed descriptions of the separate cases, the microscope and microscopical methods of examination have been employed to a considerable extent. Especially under **case I** detailed information will be found on p. 331—342, but microscopy was also made use of in several cases in the examination of the other skeletons. Under skeleton No. I special account has been given of the state of preservation of the osseous tissue, cartilaginous tissue, collagene connective tissue, elastic tissue, muscular tissue, fatty tissue etc., while likewise both the preservative, decalcifying, and destructive influence of the acid humous substances has been mentioned. Simultaneously the microscopic examination of the tissues in bog-corpses and an embalmed Egyptian mummy was mentioned.

The osseous tissue was in all cases best preserved, and even in decalcified parts the organic collagene substance was well preserved, even the finest structures, and had retained its specific tingibility to a considerable extent. The same holds good of the collagene connective tissue bundles and fibres, even very fine fibrils and nets, so that this network had apparently retained its specific, elective tingibility to staining with acid fuchsin-picric acid quite unaltered. Especially in the fatty mass in the pelvis mentioned under case I even fine connective tissue sheaths belonging to bloodvessels and around nerves were preserved, while the collagene interstitial and intramuscular connective tissue was also well preserved. Fatty cell membranes were also visible in several places. Of the striated muscles muscular fibres could be shown in spots, partly surrounded by sarcolemma (i. e. the collagene component of it). Cross-striation of the muscular fibres was not preserved in the state in which case I was subjected to examination, but it is probable, according to my experience from a corpse subjected to examination which was found in a bog, and in which the cross-striation of the muscle fibres could be shown, while it was destroyed on the addition of water to the preparation, that the humous acids could also partly in the case of the material from Herjolfsnes (Ikigait) I have preserved this striation, so that the microscopical structure mentioned could have been shown as in the bog-corpse in question. After the influences to which the tissues from case I had been exposed after exhumation it was astonishing that the fine myofibrils within the sarcolemma of the individual muscular fibres could still be shown even though the striation had disappeared. While the collagene as previously mentioned had been preserved and tanned by the humous substances, and had retained a very characteristic affinity to stains (see under case I), the elastine (the elastic tissue) had quite disappeared, probably owing to the smaller resistent power of this tissue to putrefaction. Of the preserved collagene "connective tissue"-structures some **microphotographs** are given in **Tabula LXXXV** figs. 256—258 magnified partly on a smaller, partly on a larger scale. Thus in fig. 256, are seen connective tissue septa containing blood-vessels recognisable by their preserved sheaths and collagene contents; the connective tissue meshes between the fatty cell groups etc. may also be recognised. In the thin connective tissue menbranes, seen from the surface in fig. 257, finer and coarser bundles of collagene fibrils are easily recognisable. A third microphotograph (fig. 258) shows closer membranes of connective tissue partly seen from the surface, partly from the edge, and in certain places it is very plainly seen how the fine collagene fibrils or fibril bundles diverge from each other and again unite etc.

That the osseous tissue besides its typical structure had in certain places preserved its cells tanned by humous substances so that the place of the cell-nucleus could be plainly recognised (as mentioned already under cases I and X) we merely note. Under case I we have also mentioned resorption and deposition of fresh osseous tissue.

On the articular surfaces the calcified cartilage could still be shown with its characteristic cells enclosed by capsules, see thus under case X under the examination of cavitas glenoidalis of the sound shoulderblade in contrast to the articular surface of the atrophied shoulderblade.

Of the other hard tissues besides the bones, the microscopy of the substance of the **teeth** merits further mention beyond what has already been said in the description of the individual cases.

The dentine had as a rule been deprived of a great deal of its salts of lime, but the organic collagene substance had been tanned by humous acids and was in better preservation. In many cases the external form was well-preserved even though the dentine was as a rule very brittle, but in other cases the process of putrefaction had evidently had a much greater effect from within the dental cavity, (the bacteria having grown through the radicular canals which are particularly wide in young individuals to the dental cavity), and having then caused a particularly strong process of decomposition of the dentine from within the dental cavity, by which the internal part of the dentine had become more decomposed, while the external part (the surface of the root and the area under the enamel) had retained the external shape very well, even though the dentine was sometimes reduced to a thin shell in the outermost part. On the masticatory surface, where the dentine was much exposed to wear, the tissue of this surface of wear was more calcified and densified in a thickness of abt. $^1/_3$ mm—$^1/_2$ mm and had resisted the putrefaction from the dental cavity very well. This is very characteristically seen in the photos of molar I in the lower jaw in case XX, Tabula LXXXI and LXXXII especially Fig. 248, where this densified plate of dentine on the masticatory surface covers a cavity (i. e. the much enlarged dental cavity) while the external form of the root is preserved. The cause of the more rapid decomposition in these cases of the internal layers of dentine is probably that putrefaction from within the dental cavity here took place in a small closed cavity specially protected and anaerobic, as percolating water, rainwater, etc. could not wash away the bacteria or products of metabolism formed by them — an analogy perhaps to the fact that all the bodies buried in coffins were entirely decomposed, no trace of the bones being left, while the substances formed during the decomposition of the bodies buried in their shrouds alone were more easily removed by oozing away or being washed away successively by rainwater, melted snow and ice etc. For the rest, the greatly varying destructive or conversely preservative or mummifying effect of the soil in different burial grounds is well-known.

The enamel was always much better preserved than the dentine. As it only contains abt. 3.6 p.c. of organic substance and 96.4 p.c. of hard salts of lime and has a very dense and firm structure there is nothing remarkable in the fact that here as in so many other cases it was well preserved in its shape. But as a rule the enamel was extremely brittle, and broke very easily, so that several teeth lost larger or smaller portions of their enamel during examination. This is the reason why, in the case of the teeth and jaws, both photos taken early during the investigation and others taken later when the entire material was photographed had to be reproduced. During the interval a tooth was now and then broken or lost, and a photo taken earlier had then to be reproduced even if it did not show certain other facts so well and plainly as the later one. The effect on the enamel of the acid humous substances together with the alternate thawing and freezing was a partial decalcification. This process had, however, rarely advanced very far, but the enamel had nevertheless become extremely brittle by it. For as it generally happens with an extremely slow but protracted influence of weak acid solutions on the enamel, the normally more weakly calcified "interprismatic substance" between the enamel prisms had especially become decalcified (microscopy!), therefore the enamel will very easily crack along the main direction of the prisms from the dentine surface on the crown and radially outwards to the enamel surface. But in such teeth where the enamel was specially liable to crack and had besides obtained a peculiar intranslucent, opaque appearence, microscopic examination of small particles of the enamel showed further histological changes. By a slow and cautious decalcification with thin mineral acids (as commonly employed in the microscopic examination of enamel) the salts of lime are partially removed in a characteristic way which, if whole teeth (as in the Herjolfsnes find) are exposed to a weak acid effect, of course attacks the surface first and then gradually extends its effect to the depths of the enamel towards the dentine surface. Besides acting on the interprismatic substance, the decalcification of which has been mentioned, slow decalcification will have the effect on the enamel prisms that at a certain stage when only a fraction of all the salts of lime is dissolved, the enamel prisms will show their normally very finely and regularly arranged cross striation very much accented, an appearance which disappears later on when the salts of lime are more extensively removed.

A fourth microphotograph, fig. 259 in Tabula LXXXV, showing a quite thin small piece of enamel, examined and photographed in dilute glycerine (with Zeis's Apochromat 4 mm. n. ap. 0.95 — and comp. ocular 4) magnified on a larger scale (275×) exhibits the above-described structure very plainly and handsomely, the enamel prisms on one side (towards the surface of the crowns) being more decalcified and showing a very pronounced cross striation, while those parts of the prisms that lie deeper inwards towards the surface of the dentine either do not show the usual cross striation at all or only more feebly; these profound parts are still fairly firm, but between their boundary surfaces the interprismatic substance was much decalcified and the boundary lines between the enamel prisms are thus more distinct, while the prisms separate easily.

This condition of the enamel was found with some variation in all the teeth or fragments of teeth from Herjolfsnes which were microscopically examined.

We have further on p. 340 mentioned the numerous microscopical investigations of **hair,** both human hair and animal hair, of wool made into woven material etc. besides the microscopic appearance of the hairs and their behaviour in regard to the action of bacteria and the putrifying fluids. In some cases the hairs were much decomposed, the hair-cells were in many places quite isolated and the medullary substance in the hairs dissolved, in other cases the hairs proved almost quite uninjured, or even sometimes looked as if they might have been just taken from a living individual. We have also mentioned microscopy of pieces of human skin and especially pieces of **sealskin** particularly under case I to which we refer the reader for the state of preservation of the skin. It was further mentioned that also the epidermis elements of the cutis could be plainly recognised in a few cases as well as the root sheaths round the seal hairs. To this information we shall now add particulars of a peculiar discovery subsequently made on the abovementioned piece of sealskin. It was possible to show how in many places in corium there were still parts of the **glands present,** especially the large sebacious glands, but also small branched glands, where in favourable places not only the glandular lumina could be observed, but **also the single glandular epithelial cells and their cell limits** could be recognised under the microscope! The nuclei had, however, disappeared. Some of these cells were largely filled with larger or smaller granules, probably fat granules (of sebum cutaneum) combined with some chemical substances of the soil so that they were no longer soluble in ether alcohol or xylol. This discovery was extremely astonishing but the glands observed quite corresponded with the glands attached to the hairs as was ascertained by check examination of microscopic preparations of recent preserved sealskin.

Such a discovery of glandular epithelial cells in sealskin which has lain buried for abt. 500 years in the soil of Greenland is truly astonishing, but may be explained partly by the evidently large content of fat in the sealskin, which in certain places must have acted as a protective wrapping, partly by the low temperature (of the soil) at which the putrefaction evidently took place, and finally by the fact that the decomposition of the body ceased at a comparatively early stage when the soil was beginning to be permanently frozen, never to thaw again at last.

Finally we shall mention that in at least three cases the microscopic examination conclusively showed the presence of bast fibres of vegetable substance — in cases I, X, and XVII. In X and XVII considerable remnants of cloth of a coarse texture, consisting of plant fibres that quite resembled hemp under the microscope, were further shown. The cloth fragments in question were found directly adhering to parts of the skeleton such as vertebræ, the sternum, the cranium and thus furnished the information, which was not gained by examining the dresses, that in certain cases the body had probably been wrapped in a hemp-linen covering under the woven woollen dress[1]. In Tabula XXVI, fig. 78 and Tabula XXVIII fig. 82 the vertebræ and sternum in question (text-fig. XV p. 370) from case X, are seen and in Tabula XXXIX, LXI—LXIII fig. 114 and 182—188, the cranium and temporal bones from case XVII are shown with the hemp material adhering to the surface.

For the examination of the sheep's wool[2] etc. the reader is referred to case I where a detailed account is found on p. 341.

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[1] Cp. R. Keyser: Nordmændenes private Liv i Oldtiden, p. 55 seq. Efterladte Skrifter, II, 2, Christiania 1867.

Falk Hjalmar: Altwestnordische Kleiderkunde, Kristiania 1918 p. 62—63, p. 141 seq. See also p. 210:c. Leichen- und Grabtücher.

[2] Cp. Bugge Alexander: Vesterlandenes Indflydelse paa Nordboernes Kultur i Vikingetiden, Christiania 1905. P. 142 seq. P. 258—260. P. 382.

Heyne, Moriz: Körperpflege und Kleidung, Leipzig 103. P. 213 seq. P. 221.

Chapter XII.

Dimensions of the Coffins and the probable Stature, Shoulderbreadth and Sex of the Individuals buried therein.

After the whole of the preceding investigation was concluded I received for my inspection a list of the dimensions of the coffins from Dr. Nörlund on January 31st 1924 in case anything could be concluded from the size of the coffins as to the proportions of the individuals buried therein. There were in all 31 coffins of which it had partly been possible to take the inside measures. In some cases both measures of the breadth or one of them were lacking. 14 of the coffins were children's coffins (about which see below), 17 were coffins for adult or adolescent individuals. The dimensions of the coffins for these latter are given in coffintable I. (Table 45).

In none of the coffins were found skeletal remains or other parts of the bodies, everything was decomposed. (I have already discussed the probable cause of this, see case I). In some of the coffins (Nos. 9 and 14) the outline of the decomposed body could, as mentioned by Dr. Nörlund in his paper ("Buried Norsemen"), be seen in the earth, being of a different colour to the latter. In a single case (No. 14) the approximate extension of this outline could be measured — which is of interest in the present investigation. Dr. Nörlund further mentioned (in his lecture 28th Novbr. 1922) that interment in a shroud was a substitute for interment in a coffin, but that interment in a coffin was preferred by those who could afford a coffin. We may further assume that the lack of timber was a factor, for it could be shown that some of the coffins were made of timber that had been used before (at a previous interment). Finally I mention that Mr. Mogens Clemmensen[1]), the architect, during his examination of the Norse ruins in Greenland, found a wooden coffin under the floor of the church ruin at Kakortok. The coffin measured 183 cm. in length, its breadth at the top (head) end was 33 cm. at the foot 26 cm. The obliquely placed boards which formed the long sides were 13 cm. broad at the top (head) end, but quite low at the bottom (foot) end, so that the coffin must have been quite narrow and low at the foot. In this coffin Mr. CLEMMENSEN could measure the distance between the feet of the decomposed body and the bottom end of the coffin. This distance was 10 cm. As we otherwise know so little about the deposition of these bodies in the coffins, we note this measure. The dimensions 183 cm. by 33—26 cm. show a rather long but very narrow coffin. We may mention here that coffin No. 27 from Herjolfsnes had the dimensions 180 × 35.5 and 12.5 cm. — thus it was of somewhat similar size but still narrower at the bottom end.

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[1]) Mogens Clemmensen: Kirkeruiner fra Nordbotiden m. m. i Julianehaabs Distrikt. "Medd. om Grønland" XLVII 1911, p. 305—06.

The task of saying anything probable as regards the proportions of a body that has been buried in a coffin of certain dimensions is of course a very difficult one. Naturally we can at once tell from the size of the coffin whether it can only have contained a little child or a larger child, or whether the coffin can have contained an adult individual. As a rule one must be content with this meagre result. When I have, in the present case of the coffins from Herjolfsnes, gone more closely into the matter at all, my reasons were as follows:—

By my examination of skeletons I—XXVI from the dresses I had already a thorough knowledge of the peculiar somatic constitution of these individuals, often strikingly slight and little powerful, and of their low stature.

On going over the dimensions of the 17 "adult" coffins which I tabulated according to their length, beginning with a few strikingly long and broad coffins and ending at last with a series of unusually narrow coffins (see coffintable I) I received a strong impression that due consideration had been given to the build of the individual buried in the coffin or, in other words, that it might be that the corpse had been measured before the coffin was made (as in former times and perhaps even in fairly recent times, in Denmark, and presumably elsewhere, too, at any rate among the peasantry, the joiner was ordered to measure the corpse before making the coffin, or people had their coffins ready while they were still alive). As moreover timber was at times notoriously scarce at Herjolfsnes, economy had of course to be practised in the use of this material, and this would be another reason why the inhabitants of Herjolfsnes might be supposed to proportion the coffin exactly to what was strictly necessary for each individual. Another inducement to economy was consideration for the space in the churchyard. On the whole, therefore, we may perhaps venture to assume that (with a single exception perhaps) the inside dimensions of the coffins permitted the bodies to lie extended in their entire length while the breadth at the top end must have been somewhat more than the shoulderbreadth of the body, answering to the often strongly tapering form of the coffin at the foot. There must of course also have been room for the hips in the corresponding place in the coffin, while, on the other hand, the feet of the body did not require much space at the sides. In a dead body the latter will, however, be more or less extended, reaching farther down than the heel, the anatomical structures of the ankle joint causing a plantar flection under the influence of gravity, and at the same time they will be liable to turn a little outward (rotation in the hip-joint). Hence we must reckon with a suitable space between the end of the feet and the bottom end of the coffin and with room for the clothing or shroud of the corpse. We must also assume that there has been some space between the head of the corpse and the top end of the coffin and between the sides of the coffin and the hips and shoulders of the body. The arms, have we may suppose, as a rule lain crossed or folded across the breast or abdomen, thus as a rule we find the skeleton of the hands lying in the thorax, the abdomen or the pelvis. If now we attempt to form an estimate as to whether we may expect to gather any particulars of value from an analysis of the dimensions of the coffins, we may choose different ways, while we can of course never expect to arrive at absolute certainty in the solution of such a problem. But by formulating the problem in a certain way we shall, as in the Diophantic equations, be able to draw the possibilities within the limits of a certain naturally given domain and in this way perhaps reach a solution with a certain probability.

We must therefore set the following **problem**:—

1) What proportions (height, shoulderbreadth and shoulderheight) can the body buried in each separate coffin have had if they are to be anatomically probable?

2) Which of the possible combinations of physical proportions must on examination of the special conditions in each separate case be assumed to be the most likely for the individual in question?

If it should then prove, after the calculations in all cases had been made, that a result could be reached which was both anatomically plausible and showed good agreement within the variations in the series of coffins, the collective result will gain in probability, especially if it corresponds with other particulars e. g. with conditions as we know them from the skeletons from Herjolfsnes.

If the reverse is the case we have perhaps only a negative result to register.

It is obvious that a few of the most elementary proportions in the somatic constitution of the human body must be of decisive importance in the investigation of a problem like the one under consideration. It would, however, take us too far, nor is it necessary, to survey those parts of the anatomical doctrine of proportions which refer to our case; we must assume them to be known. It must, however, be understood that though comparatively numerous measurements and investigations of the proportions of the human body have been made, we do not as yet possess as many or accurate measurements of the physical proportions in the various races, (not even of those in Europe), strata of the population, and age-groups, or of the difference between men and women, as would be desirable. Especially the variations in stature and somatic constitution of women are far from sufficiently numerically investigated as yet. We must therefore consider it a piece of great good fortune that we were able to obtain special particulars about these very facts from the skeletons at Herjolfsnes when we are to occupy ourselves with the probable build of the individuals that were buried in the coffins but have now quite disappeared.

I began, then, by arranging the coffins in series according to their 1) inside length, and 2) at the same time correspondingly according to their inside breadth at the top end and the bottom end. All the sides of the coffins were straight lines.

Table I (**coffins**) shows 17 horizontal rows and in its horizontal row I "find No. of coffins", arranged according to size and dimensions. The vertical columns under each coffin number give the figures which concern the coffin or the assumed dimensions of the body belonging to the coffin, thus in horizontal rows II, III, and IV from the top we find the inside measures for each coffin.

In **table II** (**coffins**) in row II we find the length of each coffin and in row III the difference in breadth between the top and bottom ends and the tapering coefficient per 10 cm. of the length of the coffins, and in **table III** (**coffins**) the coffins are arranged in 3 groups according to the degree of their tapering per 10 cm. of the length from the top to the bottom end.

The first group with strong tapering (from 1.25—1.7 cm. per 10 cm. of the length) comprises 6 coffins, viz. Nos. 4, 9, 27, 25, 11, and 29; these coffins are from 170 cm. to 196 cm. long.

The second group with somewhat slighter tapering (from 0.85—1 cm.) per 10 cm. of the length contains 2 very long coffins No. 2 (204 cm.) and No. 14 (193 cm.) and No. 3 (169 cm.).

The third group finally with slight tapering (from 0.84—0.4 cm.) per 10 cm. of the length comprises 6 coffins of which only one, No. 22

(180 cm.) is large, while the remaining 5, Nos. 23, 26, 30, 28, and 20, are short coffins from 165 to 154 cm. long.

These two tables, "coffin" tables II and III are employed in connection with table I to see quickly what augmentation or diminution of the breadth of the coffin and hence of the space for the shoulders (or hips) of the body takes place, if we imagine the shoulders of the body moved in the coffin a little way towards the head or the foot of the coffin and we may then, in connection with the other conditions mentioned below, quickly form an estimate of what shoulderbreadth will fit a coffin on the whole, and in what place in the coffin there is room for a suitable shoulderbreadth within the naturally given range of variation for the proportion between the length of the body and the breadth across the shoulders in man, woman, child etc.

We begin, then, by asking what maximum length it is possible that a dead body can have had (for the present disregarding the shoulderbreadth) when lying in a certain coffin. It is now, beforehand, quite clear (and will be even more so as the investigation proceeds to the other conditions) that the greatest length of the body must absolutely have been some centimeters less than the inside measure of the coffin.

But how many? Here, too, we may begin with a maximum measure for the height of the body, provisionally employed but subsequently changed in several cases, as a rule reduced, — if this maximum length will not agree with reasonable physical proportions in a man or woman. It must be said at once that certain coffins, No. 25, 11, and 30, showed excellent correspondence in dimensions with the normally proportioned bodies of the maximum height in question, see tables I and IV. But most of the other cases had to be altered somewhat in order to arrive at anatomically probable proportions.

The space which must presumably in any case be allowed at the head, the feet, and the sides of the shoulders of the body when it was to find reasonable room in the coffin even in its shroud, I will (provisionally) assume to be 3 digits above the vertex of the body, at least 3 digits below the feet of the body (the heels) (cp. Clemmensen's measures of abt. 10 cm. for the distance below the feet), and one digit on either side of the shoulders (and hips) of the body, the breadth across the shoulders being taken at the level of the shoulder-joint on the external surface of musculus deltoideus, which is somewhat more than the "biacromial breadth". The designation a digit will naturally suggest itself in these coffins — converted into centimeters we reckon one digit to be abt. 2.5 cm.

This quite provisionally assumed length of the body in a coffin has in **table I** (horizontal row V) been called: "theoretical maximum length of buried individual" and will thus be = the inside length of the coffin reduced by 15 cm. (7.5 cm. at the head and 7.5 cm. at the heel). We then proceed to calculate what proportional shoulderbreadth must normally be assumed to correspond to the theoretical maximum length. This is calculated both for men and women, and the provisionally assumed values are designated "theoretical maximum breadth of shoulders" and are given in table I in two horizontal rows, IX (if male) and X (if female). For comparison it proved very useful in this investigation in a number of cases to have a certain plausible lower limit for the shoulderbreadth of the individuals (cp. the experience from the skeletons from Herjolfsnes). This lower limit was provisionally schematically assumed to be = one-fifth of the theoretical maximum length and is given in table I in horizontal row XII as the "theoretical minimum breadth of shoulders". Of importance finally is the height from the heel to the level of the shoulderbreadth (calculated as stated above). This quantity is called the "shoulderheight" and is calculated according to anatomical proportions corresponding to the provisionally assumed theoretical maximum length in table I horizontal rows VII and VIII, and is called "theoretical maximum height of shoulders" (from the feet of the buried individual), (row VII if male, row VIII if female). By these calculations we have thus determined **4** of the most important proportions for the provisionally assumed maximum lengths of individuals for each coffin, viz. in addition to 1) the **total length,** also 2) the **shoulderbreadth,** 3) the **shoulderheight,** and 4) the **difference** between the total length and the shoulderheight, which is the **length of the head and neck** from vertex to the level of the shoulder.

It would not of course be difficult to construct other physical proportions besides these from the ordinary anatomical measures, but they are of no great interest to us at this stage.

We then proceed to examine how these provisionally constructed "normal individuals" for the various lengths of coffins correspond with the other dimensions of the coffins, viz. the breadths. Where these quite simply correspond with the "normal maximum individuals" there will obviously be no reason for us to occupy ourselves with them for the present (see coffins No. 25, 11, and 30 in table I). Where, on the other hand, the breadths and tapering of the coffins do not correspond with the proportions of the "normal maximum individuals", where there is not room enough for their shoulderbreadth in the place where they should be according to the "theoretical maximum height of the shoulders", we must as the next step in the investigation try to determine how then the height of the individual as well as the breadth at the shoulders and the shoulder-height must be altered within the anatomically given range of variation in order that the individual, who thus deviates in proportions from the maximum normal, may be placed in the coffin, and with this will perhaps also follow a somewhat altered placement in the coffin. The alteration in the length of the individual will probably be a reduction of varying degree; the shoulderbreadth which the coffin in which an individual is buried will allow of may further be determined with considerable probability if we know the length and breadth of the coffin and its tapering per 10 cm.

The tapering degree of the coffins (given in tables II and III) is for all three groups as a rule of such a nature that there are no great differences in the breadth of the coffin by a displacement in length of 10 or 20 cm. in the same coffin. As we may now with a certain degree of probability take it for granted that some space would more probably be left below the feet of the body than above its head when we consider the often strikingly narrow coffins in proportion to their length, and as a displacement of some centimeters in the placing of the shoulders in the coffin will not be able to procure more room worth noting for a greater breadth of the shoulders, — or the reverse — an imaginary arbitrary displacement of some centimeters of the shoulders of the body cannot be utilised to render uncertain the probable height of body and shoulders found in other ways.

We shall thus with a certain considerable degree of probability be able to compute the shoulderbreadth corresponding to a given coffin from the height of the buried individual by calculating, in each separate case, the naturally varying different heights, shoulderbreadths and shoulderheights corresponding to the dimensions of the coffin, and then ascertaining what somatic proportions the individual buried in the coffin must have had or what combination of anatomically probable proportions would correspond best with the dimensions of the coffin. Hereunder the question of man or woman would naturally suggest itself, certain dimensions of a coffin naturally corresponding better with male proportions, others with female proportions, while some coffins have perhaps such dimensions that they would do equally for a man or a woman. Finally, it must not, as we said, be forgotten that there must be some space on either side of the shoulders of the body for it to be conveniently placed in the coffin while there might also be some room for the shroud.

Such a series of calculations and investigations of the probable proportion between the dimensions of coffins and the somatic proportions of the body, male or female, buried therein, which might correspond with each coffin No. have been made by me. It would, however, take too much room to give the detailed calculation for each coffin in extenso. This would be unnecessary, too, as the general aspects and methods of the calculation have partly been given in the preceding lines and will partly be completed in the following. A good aid in the investigation was a drawing of the outline of all the coffins in one-tenth natural size on mm paper. The displacements could then quickly be checked.

We return to table I and find calculated here on the basis of the dimensions of the coffins in table I (rows II, III, IV) and the tapering of the coffins (tables II and III): in row XIII and XIV the width of the coffins (at the level of the theoretical maximum shoulderheight of the individuals augmented with 7.5 cm. space below the heel) respectively for a man (XIII) and a woman (XIV).

In rows XV—XVI we find the "difference between the width of the coffin" (at the level of the maximum height of the shoulders) and the "theoretical maximum breadth of the shoulders", respectively for a man (XV) and a woman (XVI).

In row XVII, finally, we find the "difference between the abovenamed width of the coffin (at the level of the theoretical maximum shoulderheight, augmented with 7.5 cm.) and the minimum shoulderbreadth = $^1/_5$ of the theoretical maximum length of the corpse in the coffin.

By comparing the figures for the same coffin (the vertical column) for the horizontal rows XIII and XIV with the horizontal rows IX, X, and XII we arrive at a very instructive comparison between the space theoretically required and actually present in the coffins for the shoulderbreadth of the body. We shall thus see, as we remarked before, that coffins Nos. 25, 11, and 30 can have contained just such a body of the provisionally assumed "theoretical maximum length". It will further be seen that coffins Nos. 2, 4, and 9 are almost of maximum normal proportions (No. 2) or a little below the normal (Nos. 4 and 9). Coffin No. 14 is very narrow compared with its length (see below), coffins No. 22 and 29 are a little below the "normal", while the rest are very narrow coffins in comparison with their length. The differences in rows XV, XVI, and XVII of table I very plainly illustrate in what direction the deviations from the purely provisionally assumed theoretical maximum proportions go for the individuals buried in the coffins.

After having made calculations and experiments with variation in the proportions regarding the anatomically most probable size and somatic proportions of the body buried in each coffin, of these considerations and calculations we now give — **The Result**:

Table 4

I	Find No. of coffins	2	4	14	9	22
II	Inside length of coffin in cm.	204	196	193	189	180
III	Inside width of coffin in cm. at the head	54	53	40	50	43
IV	Inside width of coffin in cm. at the feet	37	26	22	26	35
V	**Theoretical maximum length** of buried individual = coffin length ÷ 15 cm.	189	181	178	174	165
VI	**Calculated probable height** of buried individual and **probable sex**	181 ♂	171 ♂	167.5 ♂	164 ♂	151
VII	Theoretical max. heigth of shoulders from the feet of buried individual if ♂	158	150.5	149.5	148	137.
VIII	Theoretical max. heigth of shoulders from the feet of buried individual if ♀	..	..	..	..	132
IX	Theoretical max. breadth of shoulders of buried individual if ♂	47	45	44.5	43.5	41
X	Theoretical max. breadth of shoulders of buried individual if ♀	..	..	42	..	39
XI	**Calculated probable breadth** of shoulders of buried individual and **probable sex.**	46.4 ♂	42.7 ♂	33.5 (♂)	41 ♂	36
XII	Theoretical minimum breadth of shoulders = c. 1/5 theor. max. length	..	..	36	..	33
XIII	Width of coffin at the level of the theoretical max. shoulderheight of the individual augmented with 7.5 cm.) if ♂	50.6	47.7	36.5	46	41.
XIV	Width of coffin at the level of the theoretical max. shoulderheight of the individual augmented with 7.5 cm.) if ♀	..	..	..	..	41
XV	Difference between width of coffin at the level of the max. height of shoulders and theoretic max. breadth of shoulders if ♂	+ 3.6	+ 2.7	÷ 8	+ 2.5	⊙
XVI	Difference between width of coffin at the level of the max. height of shoulders and theoretic max. breadth of shoulders if ♀	..	..	÷ 6	..	+
XVII	Difference between above width of coffin and min. shoulder-breadth = 1/5 the theoretic. max. length of corpse	..	..	⊙	..	+

In table I, row VI we give **the calculated probable height** of the buried individuals and **the probable sex.** In table I, row XI we give **the calculated probable breadth of the shoulders** and probable sex of the buried individuals.

At coffins No. 25 and No. 11 with the same height, the shoulder-breadth is given both for a man and a woman in row XI.

The thus given probable values are those which I must, after repeated testing of the material, regard as coming nearest to the vanished reality.

If we examine the extent of the **differences between** the provisional **maximum** height of the individual **and** the calculated **prob-**

ffin Table I.

27	**25**	19	**11**	29	3	31	23	26	**30**	28	20	I
80	175	174	172	170	169	168	165	162	161.5	160	154	II
35.5	50	..	50	44	35	..	36	35	43	32	35	III
12.5	25	(27)	20	22	18	..	29	25	31	22	22	IV
65	160	159	157	155	154	153	150	147	146.5	145	139	V
35— 40 ♀	160 ? ♂ ? ♀	159 ? ♂	157 ? ♂ ? ♀	143♀	133—135♀	?	137 ♀	133—135♀	146.5 ♀	130— 132♀?	130— 132 ♀?	VI
37.5	133.4	133	131	129	128.7	127.5	125	122.5	[122.4]	121	116	VII
32	128	127.6	125.5	124	123.2	122.6	120	117.6	117.5 is ♀	116	111	VIII
41	40	[40]	39	38.7	38.5	38	37.8	37	not ♂	36.3	34.7	IX
39	38	[38]	37.4	37.2	37	..	35.7	35	35 was ♀	34	33	X
— 8♀	40 ♂ 38 ♀	37.5 (? ♂)	39 ♂ 37.4 ♀	34 ♀	28 ♀	..	30.5 ♀	29.5 ♀	35 ♀	26 ♀	28.5 ♀	XI
33	32	[32]	31	31	30.8	..	30	29.3	..	29	28	XII
31	45	..	44.2	39.6	31.7	..	34.7	33.2	..	29.4	32.5	XIII
30.3	44.5	..	43.2	39	31.2	..	34.5	33	40.3 was ♀	29	32	XIV
10	+ 5	..	+ 5	+ 1	÷ 7	..	÷ 3	÷ 4	..	÷ 6.5	÷ 2	XV
8.7	+ 6.5	..	+ 6	+ 2	÷ 6	..	÷ 1	÷ 2	+ 5	÷ 5	÷ 1	XVI
2	+ 13	..	+ 13	+ 8	⊙	..	+ 4.5	+ 3	..	⊙	+ 4	XVII

able height shown in table I when we deduct the values in row VI from the values in row V, we obtain the result: **Coffin Table IV.**

It will be seen from these (p. 511) figures that the greatest deviations occur in the narrow coffins. For 3 coffins there is no difference; for 2 coffins there is c. 8 cm., for 1 coffin 9 cm., for 3 coffins c. 10 cm. — hence only 8—10 cm. for 6 coffins; for 3 coffins there is 12—13 cm., for 2 coffins 14 cm., for 1 coffin 20 cm. and only for the narrowest 25—30 cm. If now we consider that the space which we provisionally assumed as the minimum below the heel of the body was 7.5 cm. = 3 digits, and consider that the feet are always extended somewhat, the differences found are a very natural expression for what might beforehand

Table 46. Coffin Table II: Tapering of the coffins pr. 10 cm.

I Coffin Find No...	2	4	14	9	22	27	25	19	11	29	3	31	23	26	30	28	20
II Length of coffin cm.	204	196	193	189	180	180	175	174	172	170	169	168	165	162	161	160	154
III Difference between width of head end bottom end in cm.	17	27	18	24	8	23	25	..	30	22	17	..	7	10	12	10	13
IV Tapering of the coffin per 10 cm. in cm.	0.85	1.4	0.9	1.25	0.44	1.28	1.4	..	1.7	13	1	..	0.42	0.6	0.74	0.62	0.84

be expected that just the longest measure, the length of the coffin, would hardly be quite as exactly adjusted to the exact length of the body as the width of the coffin could be adjusted to the shoulderbreadth (and breadth at the hips). As the people at Herjolfsnes of course reckoned with digits, the accuracy of the coffin measures will look even better if we employ this measure for the differences in length, (see table IV). For 9 coffins there were either no deviations or only 3—4 digits; for the remaining 7 coffins the difference for 3 coffins was 5 digits, for 2 coffins 6 digits and only for the 2 last a little more.

We could hardly expect better agreement.

If now, finally, we arrange the coffins and the individuals buried therein in groups according to the thus calculated probable true heights, in **tall,** i. e. long individuals, in **medium** almost normal, and below normal or **short** individuals as done in

Table V, coffins and individuals buried, (p. 512)

we shall get a good general view of the dimensions and propor-

Table 47. Coffin Table III: Coffins grouped after degree of tapering.

I Groups of coffins	Per 10 cm.—Tapering from 1.25—1.7 cm.						Per 10 cm. Tapering from 0.85—1 cm.			Per 10 cm.— Tapering from 0.84 cm.—0.4 cm.					
II Find No. of coffins	4	9	27	25	11	29	3	14	2	22	23	26	30	28	20
III Intern. length cm.	196	189	180	175	172	170	169	193	204	180	165	162	161	160	154
IV Tapering per 10 cm.	1.4	1.25	1.28	1.4	1.7	1.3	1	0.9	0.85	0.44	0.42	0.60	0.74	0.62	0.84

Short coffins

Table 48. Coffin Table IV.

Coffin No. buried individuals and probable sex	Theoretical max. hight ÷ probable height of buried individuals. Difference	
	in cm.	in digits (breadth)
25 (♂), 11 (8♀), 30♀ (normal)	⊙	⊙
2(♂)(abt. normal), 20♀(narrow)	8	abt. 3—4
19♂?	9	
4♂, 9♂(abt. normal) 14♂(narr.)	c. 10	
29♀ (under normal)	c. 12	abt. 5
23♀, 26♀ (narrow)	c. 13	
22♀ (under normal), 28♀ (narr.)	c. 14	abt. 6
3♀ (narrow)	c. 20	abt. 8
27♀ (very narrow)	c. 25—30	abt. 10—12

tions of the coffins on one hand and on the other of "**the probable true somatic proportions and supposed sex of the individuals buried in the coffins**".

Table V gives an exhaustive survey of the coffins, individuals and the proportions of the latter which requires no further explanation. On the whole these particulars correspond well on decisive points with what we learnt previously during the examination of the skeletons regarding the strikingly considerable number of small, narrow-shouldered individuals among the population at Herjolfsnes. Finally, it is interesting to see how alle statures and proportions arrange themselves in a conspicuously fine sequence, beginning with the large, tall, powerful individuals and (apart from the last two numbers, 19 and 31, where the width of the coffin was lacking and which cannot therefore be used to obtain information as to the shoulderbreadth) concluding with the 6—7 small and narrow-shouldered individuals quite similar in type to what we know from the small, slight female skeletons from the same locality. It is possible that a few of the smallest individuals have been young, hardly full-grown individuals, but for the sake of brevity we call them women; their proportions correspond most nearly to what we know from the small skeletons whose age and sex could be determined.

We shall now briefly survey the separate groups of **individuals in table V as if they were real.**

1) First **the long and large individuals**: **Nr. 2** is the largest and was a large, powerful, broad-shouldered man whose stature, 181 cm., answering to this, was 3.9 : 1 in comparison with the shoulderbreadth. The stature may possibly have been a little more, 185.6 cm. but this is hardly more probable than the assumed height. Possibly this indi-

Table 49 Coffin Table V. Dimensions of Coffins and Individuals buried.

No.	**Coffins** grouped after dimensions and proportions				Probable somatic proportions and supposed sex of **individuals** buried in the coffins					
	Proportions of coffins	Inside breadth cm.	Tapering pr. 10 cm.	Inside length cm.	Probable true heigth cm.	Probable true shoulder-breadth cm.	Supposed sex		Proportions of body	
							♂	♀	Height: shoulderbr.	Proportions and other remarks
I	II	III	IV	V	VI	VII	VIII	IX	X	XI
2	quite normal	54—37	0.85	204	[185.6] 181	46.4	♂	..	[4:1] 3.9:1	Broad-shouldered ♂ perhaps a foreigner
4	a little under normal	53—26	1.4	196	171 [165.5]	42.7	♂	..	4:1 [3.9:1]	normal ♂
14	very narrow	40—22	0.9	193	167.5	33.5	♂	..	5:1 [!]	NB. The outline of the decomposed body could be ascertained in the grave and measured: 173 cm. (!)
9	a little under normal	50—26	1.25	189	164	41	♂	..	4:1	abt. normal ♂
25	These 3 coffins were norm. proportionated answering to max. height of normally proport. individuals	50—25	1.4	175	160	40 ♂ [38 ♀]	♂	[♀]	4:1 ♂ [4.5:1 ♀]	abt. normal ♂
11		50—20	1.7	172	157	39 ♂ 37.4 ♀	♂?	♀?	4.09:1 ♂ 4.2:1 ♀	abt. normal ♂ normal ♀ } uncertain
30		43—31	0.74	161.5	146.5	35	..	was ♀	4.2:1	normal ♀, this coffin contained the cross with Guðveg's name
22	somewhat under normal	43—35	0.44	180	151	36	..	♀	4.2:1	normal ♀
29	somewhat under normal	44—22	1.3	170	143 [153]	abt. 34	..	♀	4.2:1 [4.5:1]	normal ♀ [narrow shouldered ♀]
27	very narrow	35·12.5	1.28	180	135—140	abt. 28 [27]	..	♀	5:1	very narrow shouldered ♀
3	narrow	35—18	1	169	133—135	abt. 28	..	♀	4.75:1	rather narrow shouldered (young) ♀
23	narrow	36—29	0.42	165	137.2	30.5	..	♀	4.5:1	narrow shouldered ♀ on the lid of this coffin stood a coffin for a little baby
26	narrow	35—25	0.60	162	133—135	29.5	..	♀	4.5:1	narrow shouldered ♀ (young)
28	narrow	32—22	0.62	160	130—132	abt. 26	..	♀	5:1	very narrow shouldered ♀ (young) [comp. Herjolfsnes XV]
20	narrow	35—22	0.84	154	130	abt. 28	..	♀	4.75:1	rather narrow shouldered ♀ (young)
[19]	..	?—27	..	174	159 (?) max.	..	♂?	..	..	..
[31]	..	..	..	168	153 (?) max.	..	..	..	..	..

vidual was a visitor from abroad, a man of more powerful build than the local population in the later times. It may perhaps have been the body of a shipwrecked man, such we know were sometimes found and taken to Herjolfsnes to be buried there, cp. the tales about "**Líka-Loðin**" who sailed along the coasts to find the bodies of ship-wrecked men and give them Christian burial[1]).

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[1]) Cp. Grønlands hist. Mindesmærker II.

On *Lig-Lodin* (*Líka-Loðin*) see Grønlands hist. Mindesmærker II p. 657 seq. A. Bjørn Johnson's summary: "In this ice from the northern ocean-bays (of Greenland) the greatest number of vessels have always been lost formerly, about which much is told in the tale of TOSTE [Godvin's son], for *Lig-Lodin* got his nickname from the fact that he often in the summer made voyages to the northern uninhabited districts [Greenland] and brought back with him to the Church the human remains which he found in caves and chasms to which they had come from floes or wrecked ships, but by them were often found runes carved about all the adventures in their mishaps and sufferings. — This Greenlandish man, *Lig-Lodin*, was shrewd and knew much. He sailed one summer with his ship from Greenland and met King HARALD SIGURDSØN [Hardrada] on his voyage to the Syder Islands [more probably the Shetlands or the Orkneys] with TOSTE trèspjót, Godvin's son" . . .

Grønlands hist. Mindesmærker II, p. 753 (from Sturlungesaga): "One of their (i. e. Thorgeir Hallason and his wife Hallbera's) sons was called EINAR who did not leave any child. He lost his life in Greenland but about the manner of his death two legends exist. One, was related by Styrkar Sigmundson from Greenland, who was a well-informed man, that the ship onboard which Einar was had been found (stranded) in the uninhabited districts [í óbygðum], but that the crew had divided into two groups who at last quarrelled because the provisions of one group were consumed before those of the other. EINAR with two others escaped and set out to find the settlement. He ascended the glacier and there they lost their lives when they were only one day's journey from the settlement. The bodies were found there next winter. EINAR's body was entire and uninjured; he is buried at Herjolfsnes".

Grønlands hist. Mindesmærker II, p. 755 (from Sturlungesaga): "The next spring after this the priest INGEMUND bespoke a passage for himself as a traveller in a vessel called Stangbolen which was fitted out for Iceland from Bergen. On this vessel was Bergthor, the son of Thore Ivarson, and many others, Icelandic as well as Norwegian, honest men. Their ship came to the uninhabited districts [óbygðir] of Greenland and the whole crew perished, but this was discovered in the following way, that 14 years after their ship and seven men were found in a cave in a rock. Among them was the priest INGEMUND; his body was entire and not putrified [perhaps mummified] as well as his clothes, but the skeletons of six men lay by him. With him was also found wax [i. e. a wax tablet] and such runes as related the circumstances of their death. But this seemed to people to be great signs that God had been well pleased with the conduct of the priest INGEMUND that he had therefore lain out so long with whole and uninjured body".

That in certain cases the bodies themselves were not always transported but only the skeletons after the flesh had been boiled off the bones may be seen from the following tale of EINAR SOKKESON. See Grønlands hist. Mindesmærker vol. II, p. 689—91, where a house full of dead people is found near a stranded vessel: "Then Sigurd said: It seems to me most advisable that you put

No. 4 and **No. 9** had normal male proportions, for No. 9 the shoulders lay near the top end of the coffin, so the body must have slipped upwards in the coffin during conveyance.

The last of the group, **No. 14,** merits special mention. The breadth across the shoulders is strikingly narrow in proportion to the length of the body, it answers to the assumed minimum limit $^1/_5$ of the height. When, after considering whether or not to assume the greater height of individual No. 14, I at last decided on the stated height of 167.5 cm. it was because the very great length of the coffin and the relative breadth at the top end in conjunction with a tapering of the coffin of 0.9 cm. per 10 cm. seemed to me to speak in favour of its having been a long individual. By a remarkable piece of good luck this was corroborated later on when I saw the description of this coffin in the proofsheet of Dr. Nörlund's paper (p. 76). Here it is stated that the body was quite decomposed but could be distinguished as an outline at the bottom of the coffin. The length of the outline of the body was 173 cm.(!). This is a remarkable corroboration of my estimate by calculation, especially when we remember that the anatomical stature is reckoned from heel to vertex and, as we said before, the feet of the body are slightly extended. — Without this accidentally preserved impression of the body on the bottom of the coffin we should not have been able to reach this valuable result, which we have then in coffin 14, where we thus, as we now know, have had a long, thin, lanky individual, in all probability a man, (perhaps a consumptive, phtisis), answering to the narrow-chested, slight women that we know from the Herjolfsnes skeletons, and have probably found in other of the coffins.

2) **The group of coffins No. 25**, **No. 11,** and **No. 30** has previously been mentioned. These coffins are of "**normal**" **proportions,** the height and shoulderbreadth of the corpses answering to the assumed "theoretical maximum length".

As regards No. 25 and No. 11 it must be said that **No. 25** must most probably be assumed to be a man, and I suppose the same of **No. 11,** but the dimensions of the coffin are such that there is a possibility of female proportions, but of a powerful, normal type of woman. These individuals thus naturally form a transition to

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the bodies in the cookingvessels that have belonged to the dead with boiling water so that the flesh may thus be separated from the bones which it will then be easier to bring to church" . . . [Similar instances are well known from other accounts from the Middle Ages and later when the bodies of distinguished persons who had been killed on crusades, for instance, were skeletonised by boiling in order that at any rate the skeleton might be taken back to their remote home].

the following individuals who must with a certain probability be assumed to be women or in a few cases were perhaps quite young.

Within the group of the normally proportioned coffins we are in the lucky case of finding an **individual who is quite certainly female,** viz. coffin **No. 30.** In this exceedingly well-preserved coffin a runic cross was found lying directly on the bottom, the inscription of which was interpreted by Professor Finnur Jónsson in his lecture in Oldskriftselskabet on the 5th of December 1922[1]). Translated, this inscription runs as follows: "This **woman** was laid overboard in the Greenland Sea, who was named **Guðveg**". As mentioned by Dr. Nörlund in his lecture on the 28th of November 1922 this woman must have died on the voyage to Greenland and been buried at sea. On their arrival in Greenland her relations or shipmates have then laid this cross as a memento of her in an empty coffin which was buried — as we see, a kind of **cenotaph.** Such burials "in effigie" are well known. To this day we often find memorial graves to persons lost at sea in the churchyards of seaside towns where there is a large population of sailors and fishermen. Dr. Nörlund subsequently mentions another possibility as more probable. Perhaps another female corpse was just going to be buried at Herjolfsnes and the opportunity was taken of laying the memorial cross to Guðveg at the bottom of this other woman's coffin.

Which of these two explanations should be preferred is a minor question, but for our purpose it is decisive that we are here, according to positive evidence dealing with a coffin designed for **a woman.** Such a dating of course renders coffin No. 30 specially interesting, and it is important that this very coffin could with great probability contain the body of a woman abt. 146.5 cm. tall, 35 cm. broad across the shoulders, of normal female somatic proportions, and this would in itself tally well with a female visitor from abroad. Her stature is near that of the tallest of the women among the skeletons from Herjolfsnes (No. I, if this individual had not been kyphoscoliotic, she would have been c. 150 cm. tall — see preceding part).

3) **Coffins No. 22 and 29** have held female bodies, the height and proportions of which are seen in table V. **No. 22** has a height of 151 cm. and the proportions of a normal woman (cp. Herjolfsnes I). **No. 29** may have been a woman 143 cm. tall and of normal female proportions, or less probably narrow-shouldered in proportion to a somewhat greater height (153 cm.).

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[1]) Cp. also his paper in this vol. LXVII of Meddelelser om Grønland No. 2, p. 271—291. This lecture was on the 5th of December 1922!

As coffin No. 29 has had the same width at the head but is both shorter and considerably more narrow at the feet than coffin 22, there is no reason to assume that she should have been longer than individual No. 22. I therefore consider the first-mentioned measures most probable, the proportions moreover correspond with others that have been ascertained among the skeletons from Herjolfsnes.

4) **The last group of coffins** are **narrow or very narrow,** viz. **Nos. 27, 3, 23, 26, 28, and 20.**

Standing on the top of coffin **No. 23** was found a small coffin for a newly-born or quite small child. This coffin had contained a body abt. 137 cm. in height and 30.5 cm. in shoulderbreadth.

The individual was narrow-shouldered and must in all probability be assumed to have been female. The somatic proportions correspond both relatively and absolutely with similar known female skeletons from Herjolfsnes. This assumption is in a most peculiar way corroborated by the discovery of the quite small child's coffin which was no doubt placed on the top of its mother's coffin. They thus died almost simultaneously — perhaps a mother who died in childbed with her newly born baby.

Parallel cases with the mother's coffin with that of the infant standing by the side of it are well known. We have previously (Chapter VIII) mentioned the difficulty of procuring nourishment for little children when the mother died and no milk could be had.

In coffin **No. 28** lay a cross. Coffin **No. 27** showed signs of the wood having been used before. About all these 6 coffins of the last group it holds good that they contained small, slender, narrow-shouldered individuals or even very narrow-shouldered individuals of comparatively low stature.

1 individual is 135—140 cm., 1 individual 137 cm., 2 individuals 133—135 cm., 2 individuals 132—130 cm. In accordance with what we know partly from the Herjolfsnes skeletons, partly from these few random particulars gathered from the coffins themselves (No. 30 and No. 23), we must with a certain probability be entitled to regard them as female coffins, the smallest of them perhaps for quite young individuals.

As I have previously pointed out, problems of this sort can only be solved with a certain probability and, more the present result does not pretend to, but on the other hand it seems to me that the results expressed in tables I and V everywhere show good accordance and consistency. The results have moreover in several places been supported or in a remarkable way corroborated by various positive finds in the coffins themselves.

Finally, these results, as regards the individuals, correspond well with the positive information we have from the Herjolfsnes skeletons themselves.

Under all reserve we may put the number of men and women at 5 or 6 men and 9 or 10 women, corresponding to the 15 coffins of which the length and breadth were known.

A certain predominance of women in the material from the churchyard as among the skeletons from Herjolfsnes may have various reasons. But among these we must not forget that as elsewhere both in the past and the present not a few men perish at sea, on the hunt, when fighting or travelling etc. and are not buried at home. This explains the predominance of the women (cp. conditions among the Eskimos who live under the same physical conditions).

It still remains to say some words about the **children's coffins**, 14 in number. The dimensions are found in the following

Table 50. Coffin Table VI. Children.

Find No.	15	5	13	6	7	10	24	8	16	18	21	17	32	13
Length	88	87	63	62	58	55	55	53	52	52	48	45	43	in complete
Breadth ...			21—13							15—10	11—7		15.5—10	

One coffin No. 13 was incomplete.

From these dimensions it will appear with all desirable plainness that 8 or 9 of the coffins had contained quite small children — newly born, who perhaps were not all of them full-term even. Perhaps several of the full-term babies were under the normal weight (undernourishment of the mothers). 2 or 3 of the coffins were of a size for children of 2 or 3 months while there were only 2 coffins which were for children of abt. 2 years of age.

One of these coffins for a child was, as we said above, standing on the lid of coffin No. 23 which probably, as we have seen, contained the corpse of the child's mother.

See further chapter VIII on the age of the individuals.

Chapter XIII.

General Results.

The anatomical examination of the skeletal remains of the 25 individuals found in the dresses has, in spite of the apparently hopelessly damaged state of the material, given rich results, far beyond what could be expected at the beginning of the examination. The majority of the results are based on palpable objective anatomical findings which have permitted a series of important inferences that, either quite conclusively or at any rate with very great probability, give us a picture of the somatic complexion and constitution, physical deformities and pathologic conditions, the probable lifetime, important circumstances as regards nutrition etc.; the examination of the crania showed the small cranial capacity and the improbability of race mixture with the Eskimoic population, all facts which have hitherto been quite unknown. Through the determinations of Dr. Nörlund the examination of the dresses has given the very important dating of the skeletons which would otherwise have been impossible. We can now know with full certainty that the not quite small random sample we have of the Norse population from Herjolfsnes gives a very peculiar picture, no doubt quite unexpected to the majority, of this population from the later and latest periods of the Norse colony before it finally perished. As described at length in Dr. Nörlund's paper, the hitherto only conjectured deterioration of the climate must be regarded as an established fact, at any rate for these tracts of Greenland. This agrees with the evident deterioration of life conditions, of the conditions of nutrition, and the gaining of a livelihood of which the anatomical examination has given a series of testimonies. In chapter XI on the state of the jaws and teeth and the nutrition conditions we have sought to elucidate this important section of the material conditions for sustaining life. An universal deterioration of the nutrition conditions, at any rate periodically frequent or later on probably also with chronic undernourishment set its stamp on most individuals. The short stature, even conspicuously short for the majority, especially in the women, but as a rule also in the male individuals, agrees exactly with such a slowly occurring deterioration of the nutrition and thus also of the somatic constitution through several generations. With this corresponds the relatively poor and slight somatic constitution, again especially in the women who for the rest — for reasons which we have partly indicated in the preceding pages — were in the majority among the individuals found in the churchyard and examined. A striking number of the individuals examined have had diseases involving physical deformities, e. g. weakening of one arm or one leg, asymmetry, scoliosis, of the back and the skeleton of the trunk on the whole, slighter rhachitic conditions seem to have occurred frequently, partly conditioning the development of various of the physical deformities above-mentioned; also tuberculosis of the vertebral column seems to have been present in one individual. Very important is the anatomical demonstration of serious pelvic deformities in two of the best preserved adult female pelves. It must after this and after findings in several other skeletons be regarded as very probable that pelvic deformities have been rather common among the women of Herjolfsnes, and even slight degrees of pelvic contractions of the forms shown above must have constituted a source of serious danger during parturition both for the life of mother and child — (compare the details mentioned under cases I and II) — especially as actual obstetric aid has been out of the question. This too must have been a very serious causal factor in a greater mortality for women and children and a danger to the renewal and survival of the population. Various different reasons besides those mentioned have of course contributed to a weakening of the population; but a periodical or chronic undernourishment or at least a serious diminution in the access to the valuable animal foods must — as shown in chapter XI and elsewhere — have been one of the chief causes of the deterioration of the population in somatic constitution and must thus have predisposed it to extinction. The examination of the jaws, the teeth, and the enormous wear in these latter, of which even quite young individuals give striking proof, even compared with the dental wear of the Eskimos, permits us with great certainty to draw the important conclusion that the population, both adults, quite young people and children must to a greater extent than suspected have been obliged to cover an essential part of their necessary consumption by greatly wearing vegetable fare the nature and possibilities of which we have also shown.

When then moreover the influx of new vigorous population elements — of fresh Northern blood — failed, again as a consequence of the decreased communication with the surrounding world, under such hard and constantly — even though quite slowly deteriorating life conditions — the evidently inevitable, frequent intermarriage among the constitutionally weakened population must have a particularly fatal effect.

In good agreement with the above-mentioned disastrous influences is the short lifetime, the high death-rate both among the quite small children and among the young. It was shown in chapter VIII, on the age of the individuals, how none of the adult individuals showed signs of belonging to the higher age-groups, and of all the twenty individuals over 18 that were examined, 10 — i. e. half — died before they had completed their 30th year. The death-rate among new-born babies was high, and of the individuals who got successfully through the first years of life the great majority had the prospect of dying before growth was quite completed.

The examination of all the crania preserved shows small cranial capacity even for the largest of them, especially conspicuously small among the individuals found in 1921. The significance of this finding has previously been mentioned in detail in chapter V where we have also mentioned the important fact that no sure sign whatever has been found of an admixture of Eskimoic blood — also this circumstance is in perfect agreement with the information gained by the archæological investigation.

The investigation of the dimensions of the coffins (chap. XII) from an anatomical point of view according to a method which, as far as the author knows, has not previously been employed, has yielded important information which entirely corroborates that a great number of the individuals buried in the coffins have had a short stature and slight build which corresponds perfectly with a number of the skeletons examined.

The vigorous northern race that originally colonised Greenland degenerated in the course of the centuries under the influence of the hard and at last constantly deteriorating life conditions and other unfavourable conditions, especially isolation both intellectually, materially and as regards race hygiene. It became a race of small people, little powerful, physically weakened, with many defects and pathologic conditions.

That a race so small in number, so weakened both by internal and external unfavourable life conditions has nevertheless been able to stay so gallantly at its post so long, much longer than was before conceived possible, speaks highly of the original quality of the race.

In a fight the Norse must no doubt have been superior to the Eskimos, but the descendents of the people who sailed “westward on the sea” in small open boats and settled on the inclement shores of Greenland, defying nature through centuries, often at war with one another, did not succumb in a struggle with men alone. Against constantly more severe physical conditions, against cold and a slow periodical starvation and in greater and greater isolation the Northern race could not at last defend itself. Influences of nature which slowly and insidiously through the short lifetime of several generations undermined the vitality of the race itself could in the long run only be conquered by help from the main country and by an inflow of fresh blood to give vitability to the enfeebled race.

This did not happen. In Norway, the main country, the population were too much occupied by many other things and in other ways to be able to succour the impoverished population which, as at any rate the papal letters indicate, was both materially and mentally in distress. Against the Eskimo population, so brilliantly adapted to the arctic conditions the physically weakened Norse race could not, as we now know, hold out. Its doom was sealed by the ice of Greenland.

XIV. List of Literature.

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— 37. Femur dext. medial aspect. $^1/_3$ nat. NB. Femur dext. ant. aspect, see fig. 1, Tabula I.

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Tabula XIII.

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Tabula XIV.

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— 45. Femur sin. post. aspect. $^1/_3$ nat.
— 46. Femur sin. lat. aspect. $^1/_3$ nat.
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TABULA XVII.

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TABULA XIX.

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TABULA XX.

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TABULA XXI.

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— 57. Caput scapulæ sin. et dext. $^1/_1$ nat. Cloth adherent. Ant. aspect.
— 58. Cavitas glenoidalis scapulæ dext. et sin., dext. is much larger. $^1/_1$ nat.
— 59. Caput scapulæ dext. et sin. $^1/_1$ nat. Post. aspect.
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TABULA XXII.

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— 62. Os temporale sin Inf. aspect. $^1/_1$ nat. The limits of fossa mandibularis in fig. 61 and fig. 62 corresponds * *. Fossa mandibularis sin. is much expanded.
— 63. Os temporale dext. Lat. aspect. $^1/_1$ nat.
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Tabula XXIII.

Fig. 65. Os temporale sin. Inferior and posterior aspect. $^{1}/_{1}$ nat.
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Fig. 67. Atlas, massa lateralis dext. et sin. From above. $^{1}/_{1}$ nat.
— 68. Atlas, massa lateralis dext. et sin. From below. $^{1}/_{1}$ nat.
— 69. Atlas, massa lateralis sin. Lateral aspect. $^{5}/_{4}$ nat.
— 70. Atlas, massa lateralis sin. From behind. $^{5}/_{4}$ nat.
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Tabula XXV.

Fig. 71. Massæ laterales Atlantis, adduced. Superior aspect. $^{5}/_{3}$ nat.
— 72. Massæ laterales Atlantis. Inferior aspect. $^{5}/_{3}$ nat.

Tabula XXVI.

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— 74. Vertebra cervicalis IV. inf. aspect. $^{1}/_{1}$ nat.
— 75. Vertebra cervicalis IV. ant. aspect. $^{1}/_{1}$ nat.
— 76. Vertebra cervicalis IV. post. aspect. $^{1}/_{1}$ nat.
— 77. Vertebra cervicalis V. ant. aspect. $^{5}/_{4}$ nat.
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— 78. Vertebra dorsalis X. ant. facies. $^{5}/_{3}$ nat.
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Tabula XXVII.

Fig. 79, 80, 81 a. Columna vertebralis cervicalis, 2nd v. c. ➳ 1st v. d. $^{1}/_{1}$ nat.

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In fig. 80, lateral facies, left, note the anterior concavity espec. in relation to the I dorsal vertebra.

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Tabula XXVIII.

Fig. 81 b. Columna vertebralis, vertebræ cervicales I—VII + vertebra dorsalis I. Anterior facies. $^{1}/_{1}$ nat.
— 82. Columna vertebralis thoracalis, vertebræ dorsales III—X. Ant facies. $^{1}/_{1}$ nat.
Note! Cloth (hemp) on the vertebræ III, IV, V and VIII, IX, X.

Tabula XXIX.

Columna vertebralis cervicalis, v. c. I—VII + v. d. I.

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— 88. Clavicula dext. ant. aspect. $^1/_1$ nat.
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— 90. Manubrium sterni, post. facies. $^1/_1$ nat.
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Fig. 93. Os coxæ sin. ant. aspect. (XV). $^1/_3$ nat.
— 94. Os coxæ sin. lat. aspect (XV). $^1/_3$ nat.
— 95. Os pubis sin., pars symphysis, post. facies (XV). $^1/_1$ nat.
— 96. Os pubis sin., pars symphysis, ant. facies (XV). $^1/_1$ nat.
— 97. Patellæ sin. dext. post. aspect (XV). $^1/_1$ nat.
Note patella dext. larger than sin.

Tabula XXXIII.

Fig. 98. Femora, ant. aspect. $^1/_3$ nat.
Note outline of femur dext. printed on femur sin.
— 99. Tibiæ, ant. aspect. $^1/_3$ nat.
— 100. Patellæ dext. sin. ant. aspect (XV). $^1/_1$ nat.
Note. patella dext. larger than sin.

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— 104. Talus dext. and sin. sup. aspect. $^1/_1$ nat.

Tabula XXXVI.

Fig. 105. Calcaneus dext. and sin. sup. aspect. $^1/_1$ nat.
— 106—107. Calcaneus dext. and sin. post. aspect. $^1/_1$ nat.
— 108. Calcaneus dext. and sin. inf. aspect. $^1/_1$ nat.

Tabula XXXVII.

Fig. 109. Talus + Calcaneus, dext. and sin. ant. aspect. $^1/_1$ nat.
— 110. Talus + Calcaneus, dext. and sin. superior aspect. $^1/_1$ nat.
— 111. Talus + Calcaneus, dext. and sin. post. aspect. $^1/_1$ nat.

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Fig. 112. Talus + Calcaneus, dext. and sin. lateral aspect. $^1/_1$ nat.
— 113. Talus + Calcaneus, dext. and sin. medial aspect. $^1/_1$ nat.

Herjolfsnes XVII.

Tabula XXXIX with figures 114—119.

TABULA XXXIX.

Fig. 114. Os temporis dext. lateral aspect. $^1/_1$ nat. Note! cloth of hemp.
— 115. Os temporis dext. Facies inf. lat. $^1/_1$ nat.
— 116. Os temporis sin. Facies inf. med. $^1/_1$ nat.
— 117. Atlas, massa lat. sin. Facies sup. $^3/_2$ nat.
— 118. Atlas, massa lat. sin. Facies inf. $^3/_2$ nat.
— 119. Atlas, massa lat. sin. Facies sup. $^3/_2$ nat.
Note! Sulcus art. vertebralis.

Herjolfsnes XX.

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TABULA XL.

Fig. 120. Atlas + Epistropheus, ant. aspect. $^1/_1$ nat.
— 121. Atlas + Epistropheus, post. aspect. $^1/_1$ nat.
— 122. Atlas, inf. aspect. ca. $^9/_8$ nat.
— 123. Atlas + Epistropheus, sup. aspect. $^1/_1$ nat.

TABULA XLI.

Fig. 124. Ossa temporis dext., sin. inferior aspect. $^1/_1$ nat.
— 125. Os temporis sin. lateral aspect. $^1/_1$ nat.
— 126. Os temporis dext. lateral aspect. $^1/_1$ nat.
— 127. Ossicula auditiva dext. 3,5 × nat. size.

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Fig. 128. Costa I dext. Facies sup. $^1/_1$ nat.
— 129. Sternum. Facies ant. c. $^1/_1$ nat.
— 130. Manubrium sterni. Facies post. with 2 vertebræ. c. 0,97:1 nat.
— 131. Corpus sterni. Facies post. c. 0,97:1 nat.

TABULA XLIII.

Fig. 132. Scapula sin. Facies post. $^4/_5$ nat.
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TABULA XLIV.

Fig. 135. Clavicula dext. and sin. Facies sup. $^2/_3$ nat.
— 136. Claviculæ dext. and sin. Facies inf. ab. $^2/_3$ nat.
— 137. Scapula dext. Angulus inf. with epiphysis. Facies post. c. $^7/_4$ nat.
— 138. Scapula sin. Cavitas glenoidalis. Acromion ÷ epiphysis. c. $^4/_3$ nat.

TABULA XLV.

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TABULA XLVII.

Fig. 145. Articulatio humero-ulnaris dext. Ant. aspect. c. $^5/_6$ nat.
— 146. Articulatio humero-ulnaris sin. Ant. aspect. c. $^5/_6$ nat.
— 147. Ulna sin. Extremitas sup. Ant. aspect. c. $^5/_6$ nat.
— 148. Radius dext. + Ulna dext. Extremitas inf. ant. aspect. $^1/_1$ nat.

TABULA XLVIII.

Fig. 149. Femora dext. sin. ant. aspect. $^1/_3$ nat.
— 150. Femora dext. sin. lat. aspect. $^1/_3$ nat.
— 151. Femur dext. Condylus lateralis. $^2/_3$ nat.

TABULA XLIX.

Fig. 152. Femora dext. sin. medial aspect. $^1/_3$ nat.
— 153. Femora dext. sin. post. aspect. $^1/_3$ nat.
— 154. Femur dext. Facies post condylorum. c. $^4/_5$ nat.

TABULA L.

Fig. 155. Femur sin. Condylus medialis (arthritis). $^4/_5$ nat.
— 156. Patellæ dext. sin. Facies ant. $^1/_1$ nat.
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Note patella sin. larger than dext.

TABULA LI.

Fig. 158. Tibia dext. Condylus med. c. $^2/_3$ nat.
— 159. Os coxæ sin. lateral aspect. $^1/_2$ nat.

Herjolfsnes XIX.

TABULA LII.

Fig. 160. Sternum. Vertebra dorsalis, facies sup. Vertebra lumbalis, facies ant. Note! The asymmetry (Scoliosis) $^6/_{10}$ nat. Cp. also Text-figure XVIII p. 403.

Crania.

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Ikigait 344.

TABULA LII.

Fig. 161. Norma facialis. $^3/_5$ nat.

TABULA LIII.

Fig. 162. Norma temporalis sin. $^3/_5$ nat.
— 163. Norma basalis. $^3/_5$ nat.

TABULA LIV.

Fig. 164. Norma occipitalis. $^3/_5$ nat.
— 165. Norma parietalis. $^3/_5$ nat.

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Tabula LV.

Fig. 166. Norma temporalis sin. $^3/_5$ nat.
— 167. Norma basalis. $^3/_5$ nat.

Tabula LVI.

Fig. 168. Norma occipitalis. $^3/_5$ nat.
— 169. Norma parietalis. $^3/_5$ nat.

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Fig. 170. Norma facialis. $^3/_5$ nat.

Herjolfsnes II.

Tabula LVII.

Fig. 171. Norma facialis. $^2/_5$ nat. **not** $^3/_5$ nat. as in plate LVII.

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Fig. 172, 173, 174, Ikigait 343, Norma parietalis, norma temporalis dext. and Norma occipitalis in $^2/_5$ nat. to compare with
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Tabula LX.

Fig. 180. Norma occipitalis $^3/_5$ nat.
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Herjolfsnes XVII.

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Fig. 182. Norma frontalis. $^3/_5$ nat.
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Tabula LXII.

Fig. 185. Norma temporalis dext. $^3/_5$ nat.
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Tabula LXIII.

Fig. 187. Norma temporalis sin. $^3/_5$ nat.
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Herjolfsnes XVIII.

Tabula LXIV.

Fig. 189. Norma temporalis sin. $^3/_5$ nat.
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Tabula LXV.

Fig. 191. Norma temporalis dext. $^3/_5$ nat.
— 192. Norma facialis. ab. $^1/_2$ nat.

Tabula LXVI.

Fig. 193. Norma frontalis. $^3/_5$ nat.
— 194. Norma occipitalis I. $^3/_5$ nat.
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Herjolfsnes X.

Tabula LXVII.

Fig. 196. Os frontale, facies ant. ab. $^3/_4$ nat.
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Herjolfsnes XX.

Tabula LXVII.

Fig. 198. Os frontale + os parietale sin. Lateral aspect. $^5/_7$ nat.

Teeth and Jaws.

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Tabula LXVIII.

Eskimo, man, 30—35 years. Ivigtut.

Fig. 199. Maxilla sup. Facies masticatoria dentium. $^1/_1$ nat.
— 200. Mandibula. Facies masticatoria dentium. $^1/_1$ nat.

Tabula LXIX.

Eskimo, woman, 30—40 years. Ivigtut.

Fig. 201. Maxilla sup. Facies masticatoria dentium. $^1/_1$ nat.
— 202. Mandibula. Facies masticatoria dentium. $^1/_1$ nat.

Tabula LXX.

Medieval man. Denmark. Særslev 13th century.

Fig. 203. Maxilla sup. Facies masticatoria dentium. $^1/_1$ nat.
— 204. Mandibula. Facies masticatoria dentium. $^1/_1$ nat.

Herjolfsnes II.

Tabula LXXI.

Fig. 205. Mandibula, superior aspect. $^2/_3$ nat.
— 206. Mandibula, sin. $^2/_3$ nat.
— 207. Mandibula, dext. $^2/_3$ nat.
— 208. Mandibula. Facies masticatoria dentium. $^1/_1$ nat.

Herjolfsnes X.

Tabula LXXII.

Fig. 209. Maxilla dext. lat. $^1/_1$ nat.
— 210. Maxilla sin. lat. $^1/_1$ nat.
— 211. Maxilla dext. med. $^1/_1$ nat.
— 212. Maxilla sin. med. $^1/_1$ nat.
— 213. Maxilla, A. assembled. Facies masticatoria dentium. ab. $^9/_{10}$ nat.
— 214. Maxilla, B. Right and left half separate. Facies masticatoria dentium. $^1/_1$ nat.
— 215. Mandibula, from above. Facies masticatoria dentium. ab. $^9/_{10}$ nat.

TABULA LXXIII.

Fig. 216. Mandibula sin. med. $^1/_1$ nat.
— 217. Mandibula sin. lat. $^1/_1$ nat.
— 218. Mandibula dext. med. $^1/_1$ nat.
— 219. Mandibula dext. lat. $^1/_1$ nat.

TABULA LXXIV.

Fig. 220. Mandibula. Facies masticatoria. $^3/_2$ nat.
— 221. Mandibula sin. $^1/_1$ nat.
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Herjolfsnes XVII.

TABULA LXXV.

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— 224. Maxilla sin. med. $^1/_1$ nat.
— 225. Maxilla dext. lat. $^1/_1$ nat.
— 226. Maxilla sin. lat. $^1/_1$ nat.
— 227. Maxilla. Facies masticatoria dentium. $^1/_1$ nat.

TABULA LXXVI.

Fig. 228. Mandibula. Facies masticatoria dentium. $^3/_2$ nat.
— 229. Mandibula, superior aspect. $^1/_1$ nat.
NB. **Torus mandibularis*.

TABULA LXXVII.

Fig. 230. Mandibula sin. med. $^1/_1$ nat.
— 231. Mandibula sin. lat. $^1/_1$ nat.
— 232. Mandibula dext. med. $^1/_1$ nat.
— 233. Mandibula dext. lat. $^1/_1$ nat.

TABULA LXXVIII.

Fig. 234. Mandibula. ab. 0,85 nat.
NB. **Torus mandibularis*.
— 235. Mandibula sin. $^1/_1$ nat.
— 236. Mandibula dext. $^1/_1$ nat.

Herjolfsnes XVIII.

TABULA LXXIX.

Fig. 237. Mandibula, A. $^2/_3$ nat.
— 238. Mandibula, B. $^2/_3$ nat.
— 239. Mandibula, C. Facies masticatoria dentium. $^1/_1$ nat.

TABULA LXXX.

Fig. 240. Mandibula sin. med. $^1/_1$ nat.
— 241. Mandibula sin. lat. $^1/_1$ nat.
— 242. Mandibula dext. med. $^1/_1$ nat.
— 243. Mandibula dext. lat. $^1/_1$ nat.

Herjolfsnes XX.

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— 245. Mandibula sin. lat. $^1/_1$ nat.
— 246. Mandibula dext. med. $^1/_1$ nat.
— 247. Mandibula dext. lat. $^1/_1$ nat.

Tabula LXXXII.

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— 249. Maxilla, inferior aspect. Facies masticatoria dentium. $^4/_5$ nat.

Tabula LXXXIII.

Fig. 250. Maxilla sin. lat. $^{11}/_{10}$ nat.
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— 252. Maxilla sin. med. $^{11}/_{10}$ nat.

Tabula LXXXIV.

Fig. 253. Maxilla dext. lat. $^{11}/_{10}$ nat.
— 254. Maxilla dext. Facies masticatoria dentium. $^{11}/_{10}$ nat.
— 255. Maxilla dext. med. $^{11}/_{10}$ nat.

Microphotos.

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— 257. Connective tissue, collagene. 70 × magnified. (Case I).
— 258. Connective tissue, collagene. 320 × magnified. (Case I).
— 259. Enamel from tooth. 275 × magnified. (Case X).

For further explanation see Text Chapter XI.

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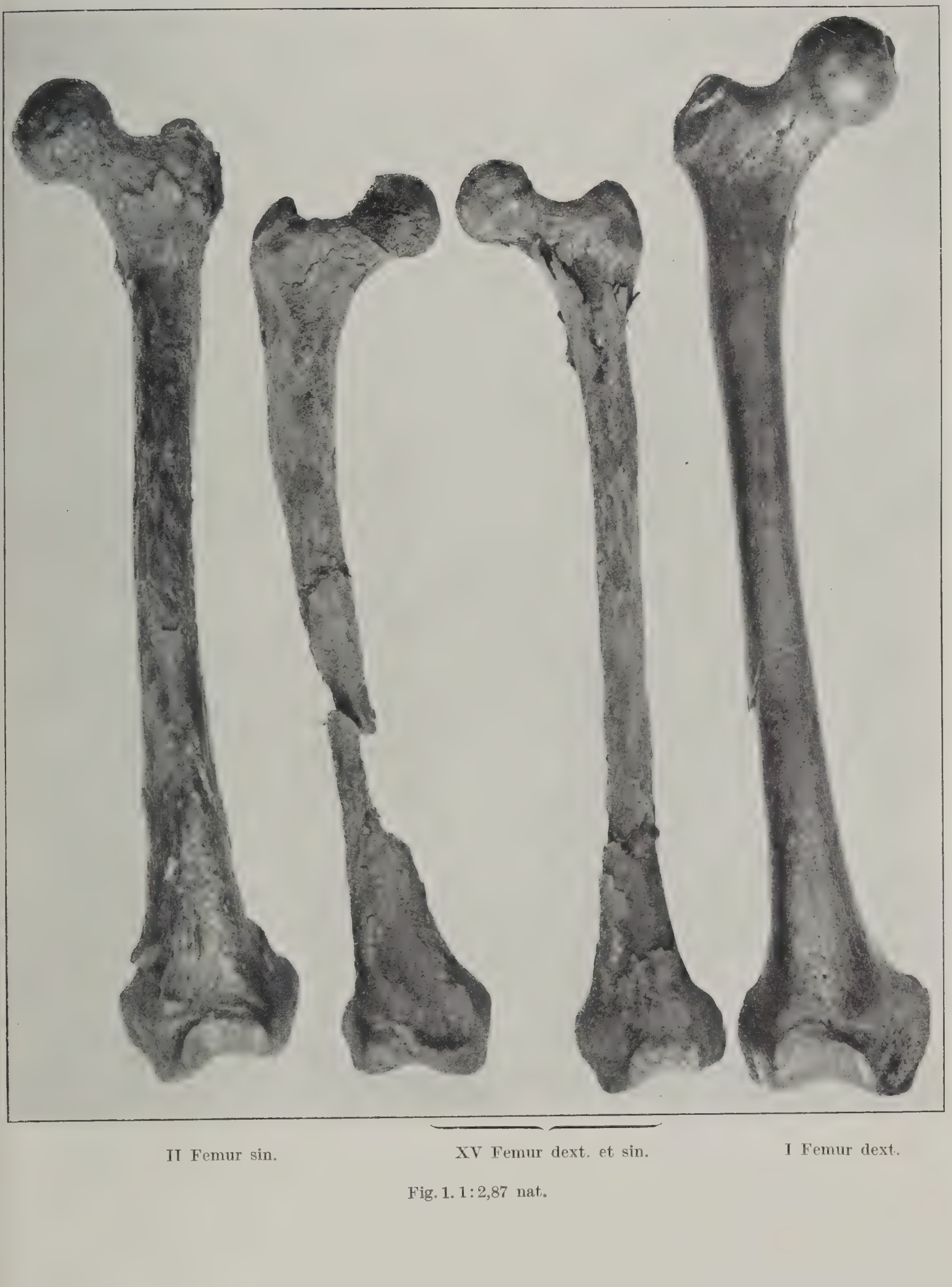
HERJOLFSNES I.

TABULA I—XII

WITH

FIGURES 1—37

Herjolfsnes II–XV–I. Fig. 1



II Femur sin. XV Femur dext. et sin. I Femur dext.

Fig. 1. 1:2,87 nat.

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Herjolfsnes I. Fig. 2–7

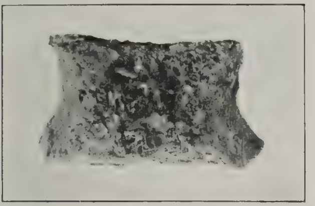

Fig. 2. $^1/_1$ nat. ant. aspect.

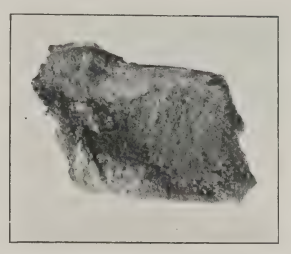

Fig. 3. $^1/_1$ nat. right side.

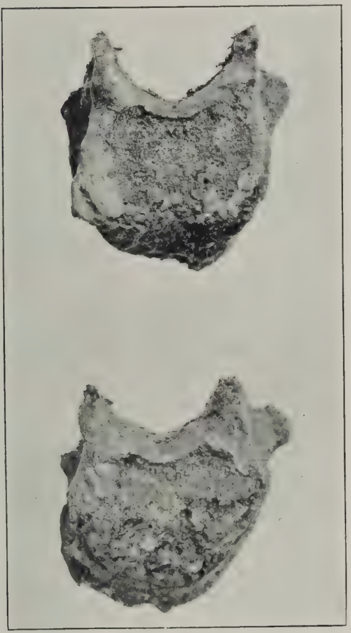

Fig. 4 a. b. $^1/_1$ nat. from above.

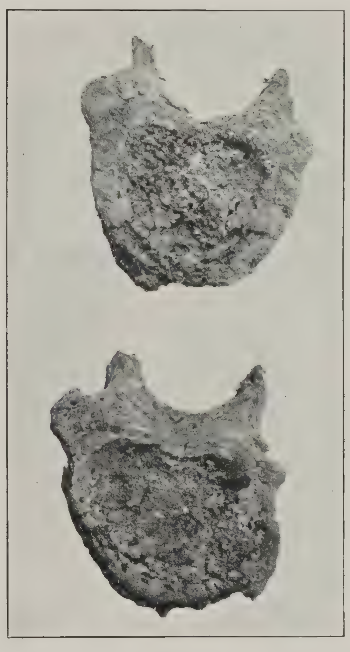

Fig. 5 a. b. $^1/_1$ nat. from below.

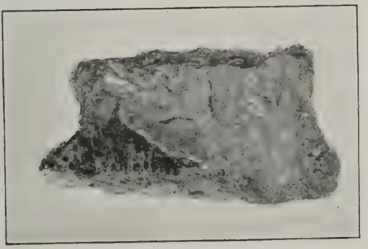

Fig. 6. $^1/_1$ nat. lower dorsal vertebra
ant. aspect.

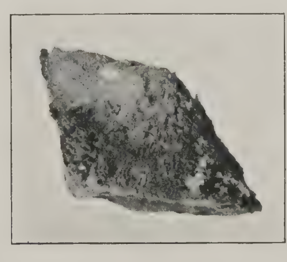

Fig. 7. $^1/_1$ nat. right side.

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Herjolfsnes I. Fig. 8–13

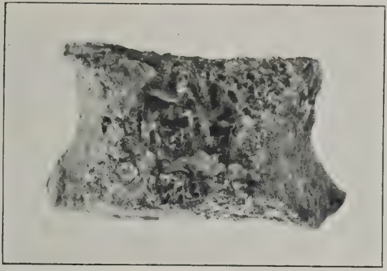

Fig. 8. $^4/_3$ nat. ant. aspect.

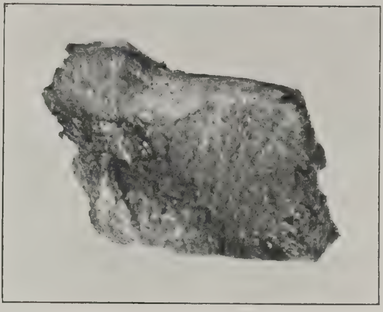

Fig. 9. $^4/_3$ nat. right side.

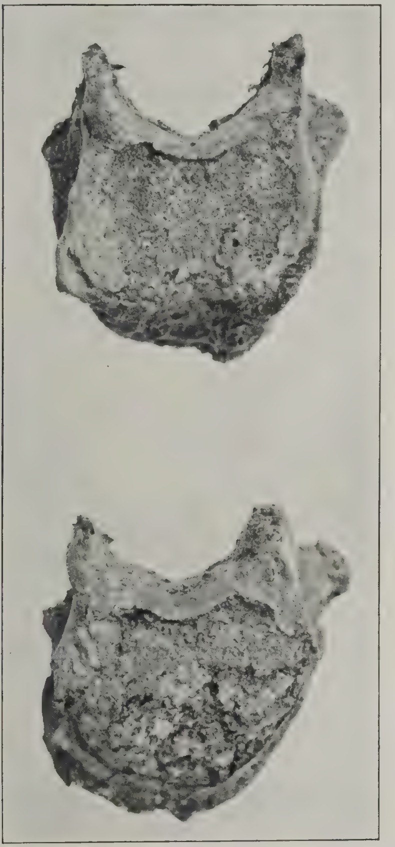

Fig. 10. a. b. $^4/_3$ nat. from above.

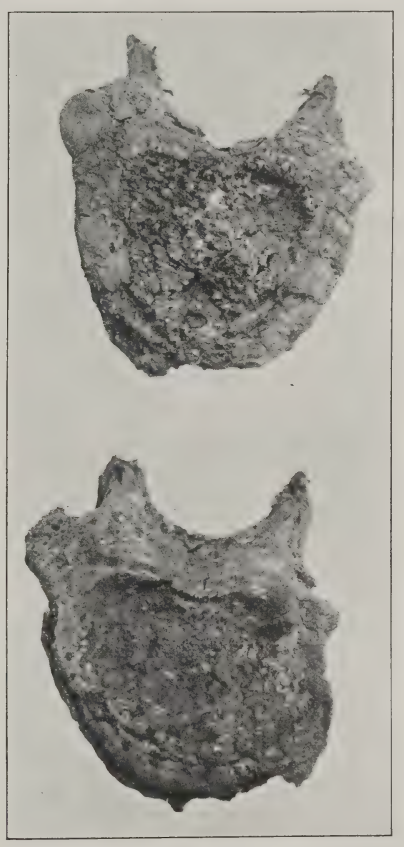

Fig. 11. a. b. $^4/_3$ nat. from below.

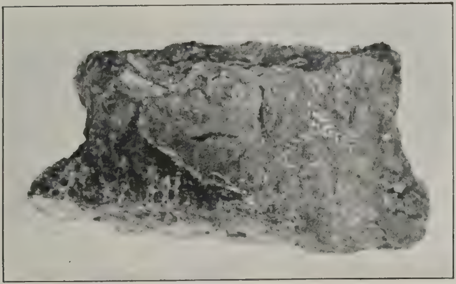

Fig. 12. $^4/_3$ nat. lower dorsal vertebra ant. aspect.

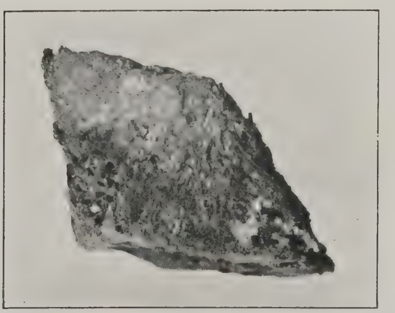

Fig. 13. $^4/_3$ nat. right side.

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Herjoltsnes I. Fig. 14–15

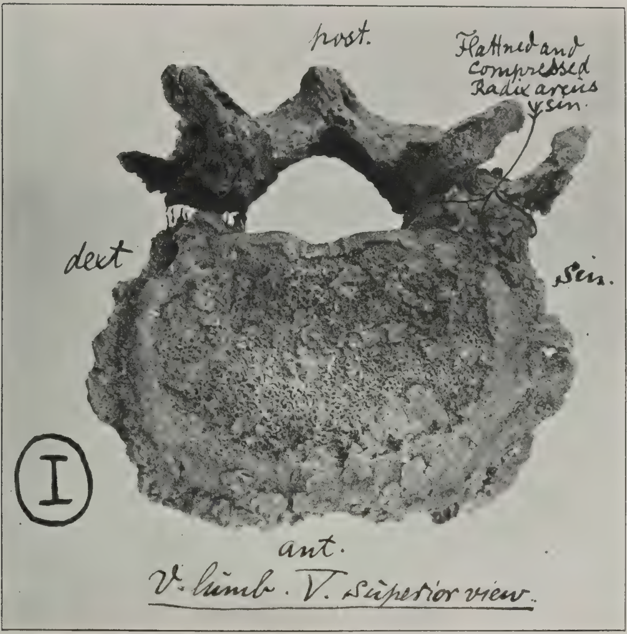
post.
Flattned and compressed Radix arcus sin.
dext
sin.
I
ant.
V. lumb. V. superior view.

Fig. 14. $^1/_1$ nat. V. lumb. V. superior view.

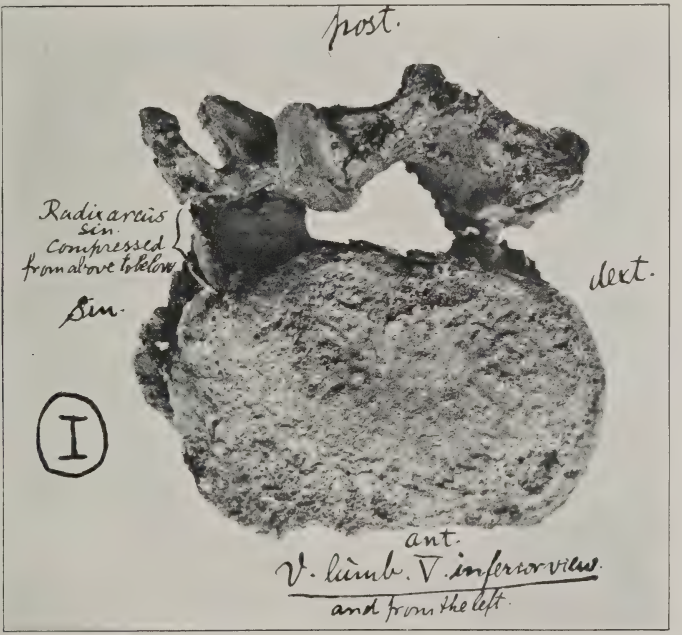
post.
Radix arcus sin. compressed from above to below
Sin.
dext.
I
ant.
V. lumb. V. inferior view
and from the left

Fig. 15. $^1/_1$ nat. V. lumb. V. inferior view and from the left.

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Herjolfsnes I. Fig. 16–18

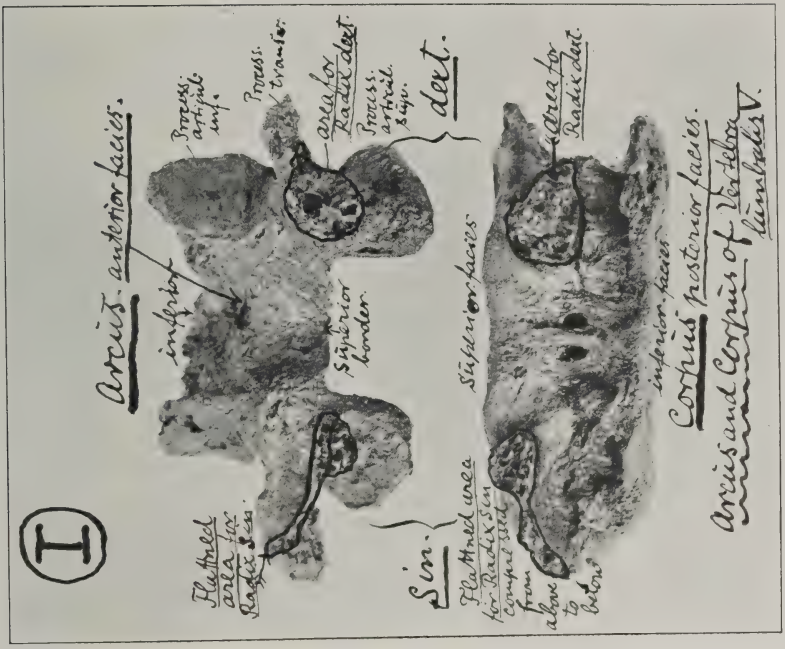

Fig. 16.

$^{1}/_{1}$ nat. Vertebra lumbalis V. Arcus anterior facies. Corpus posterior facies.

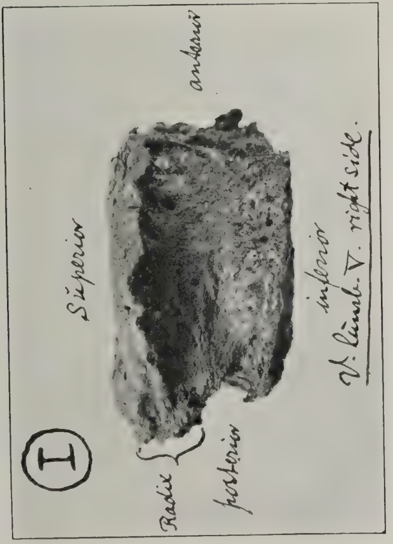

Fig. 17. $^{1}/_{1}$ nat. Vertebra lumbalis V. right side.

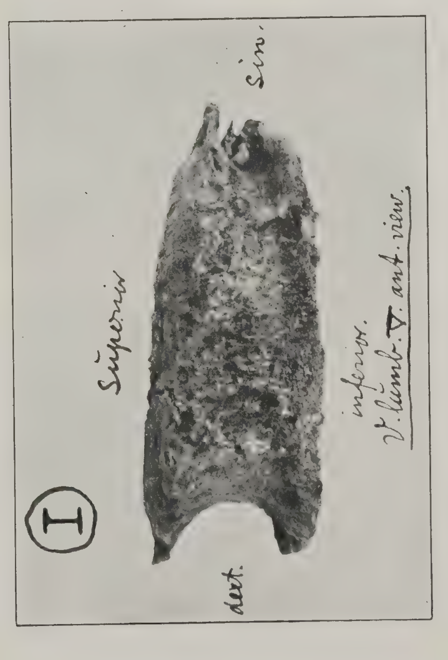

Fig. 18. $^{1}/_{1}$ nat. Vertebra lumbalis V. ant. view.

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Herjolfsnes I. Fig. 19–21.

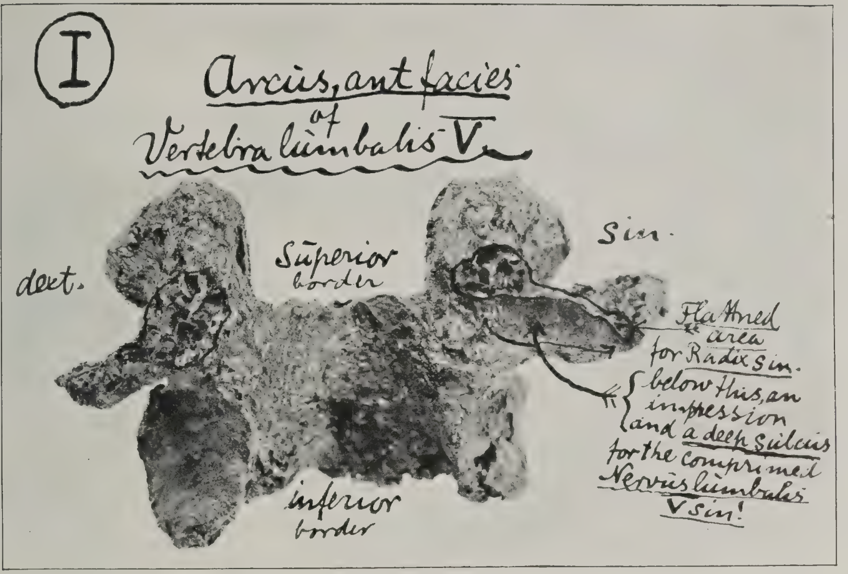

Fig. 19. $^5/_4$ nat. Vertebra lumbalis V. arcus ant. facies.

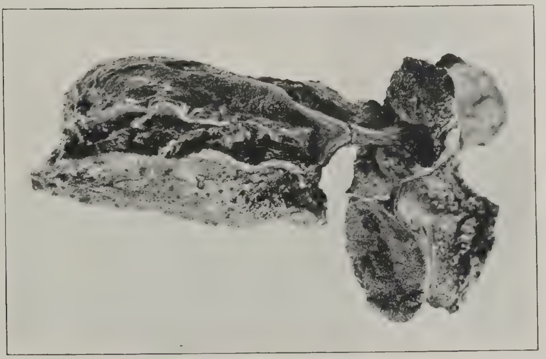

Fig. 20. $^1/_1$ nat. Vertebra lumbalis V. left side.

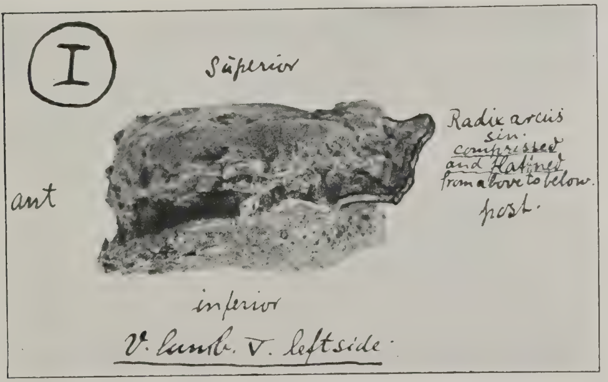

Fig. 21. $^1/_1$ nat. Vertebra lumbalis V. corpus left side.

Herjolfsnes I. Fig. 22–23.

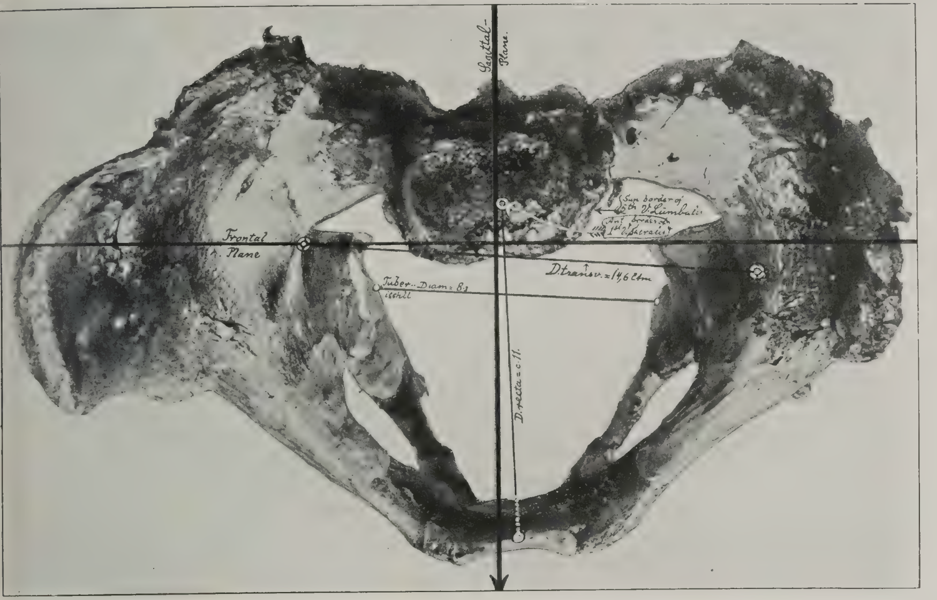
Sagittal-Plane.
Frontal Plane
Sup. border of 5th V. Lumbalis
Ant. border of 1st V. Sacralis
D. transv. = 14,6 Ctm
Tuber. ischii Diam. = 8.3
D. recta = c. 11.

Fig. 22. $^5/_{12}$ nat. Pelvis of woman I. Superior aspect. Asymmetrical, enlarged in the superior aperture and having a funnel-shaped contraction in the inferior aperture.

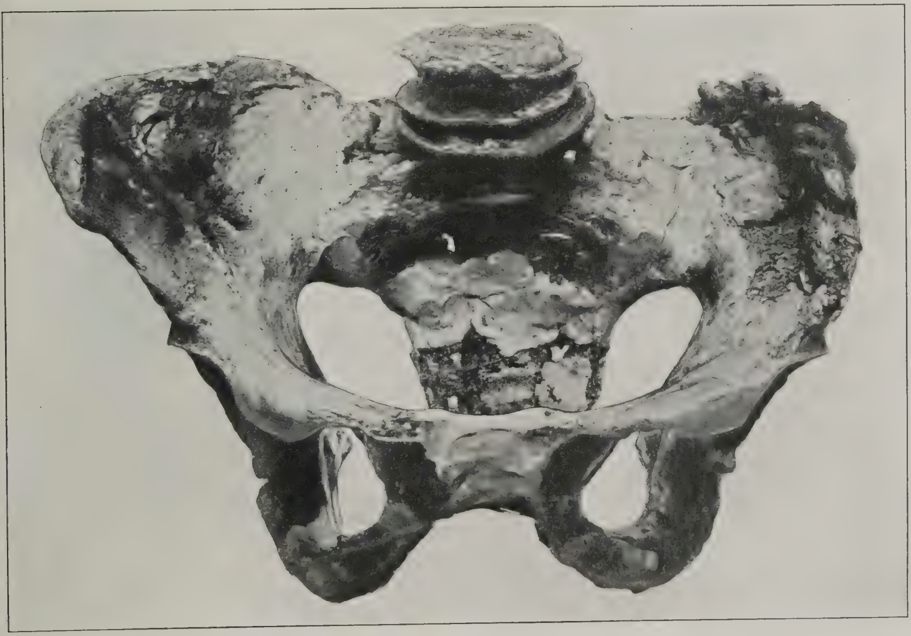

Fig. 23. $^5/_{12}$ nat. Pelvis of woman I. Anterior aspect.

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Herjolfsnes I. Fig. 24–27

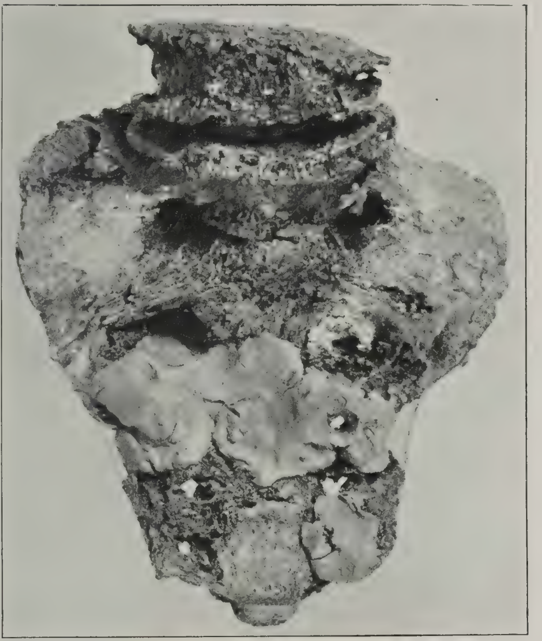

Fig. 24. 1/2 nat.
Os sacrum + v. lumb. V. ant. aspect.

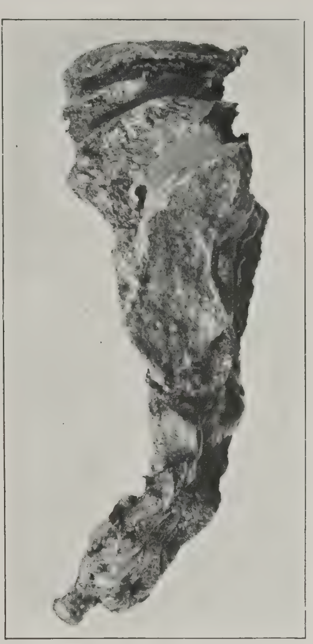

Fig. 26. 1/2 nat.
Os sacrum + v. lumb. V. left side.

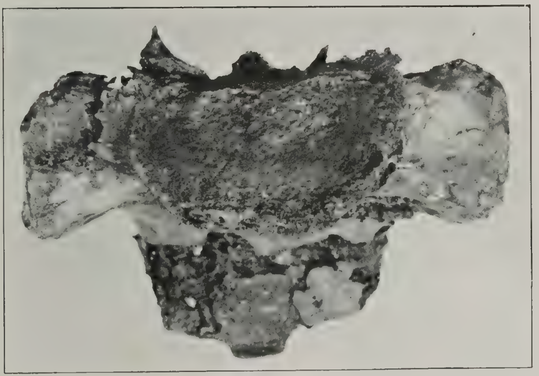

Fig. 25. 1/2 nat. Os sacrum sup. aspect.

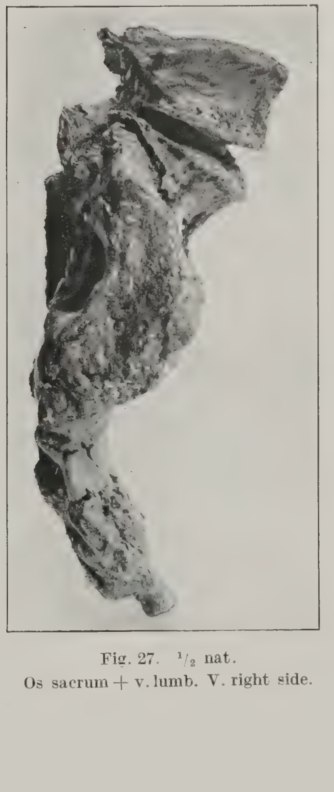

Fig. 27. 1/2 nat.
Os sacrum + v. lumb. V. right side.

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Herjolfsnes I. Fig. 28–29

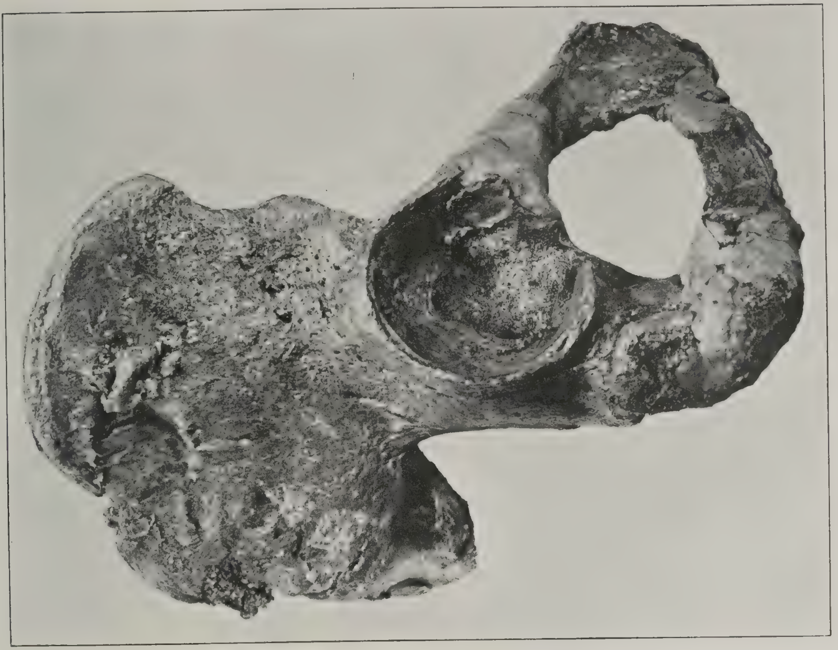

Fig. 28. 1/2 nat. Os coxæ dext. facies lat.

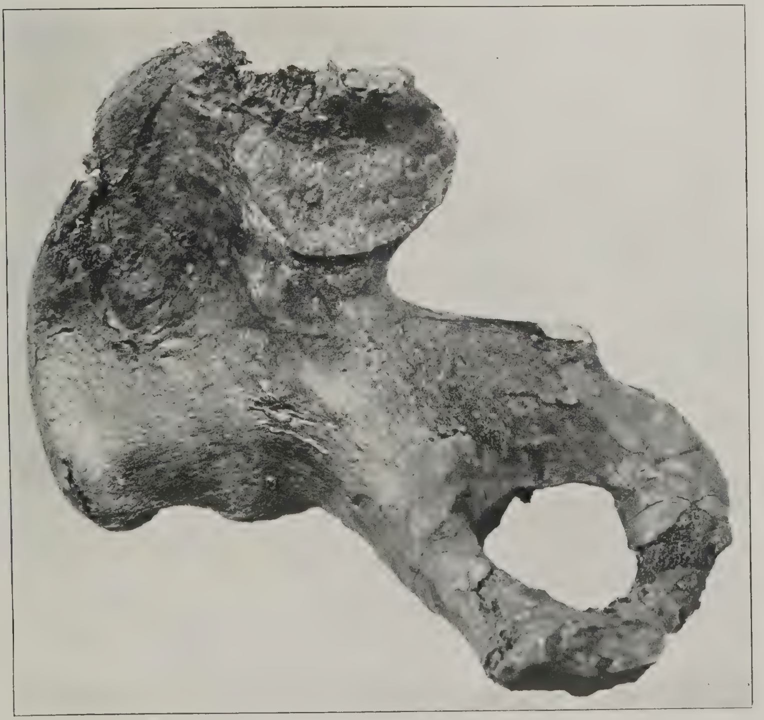

Fig. 29. 1/2 nat. Os coxæ dext. facies med.

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Herjolfsnes I. Fig. 30–31

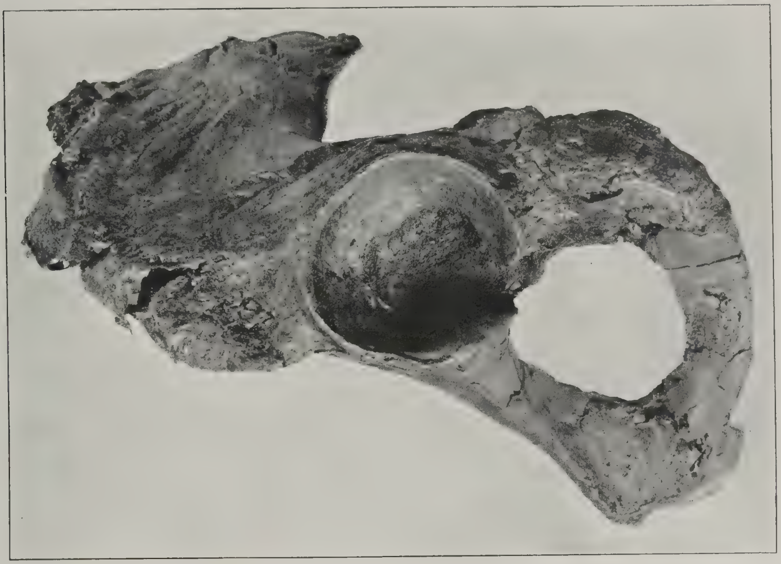

Fig. 30. $^1/_2$ nat. Os coxæ sin. facies lat.

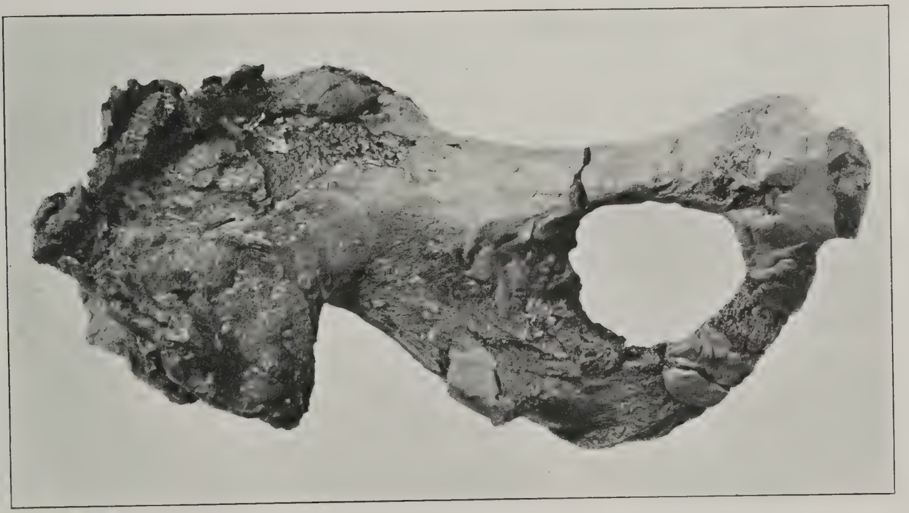

Fig. 31. $^1/_2$ nat. Os coxæ sin. facies med.

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Herjolfsnes I. Fig. 32–34

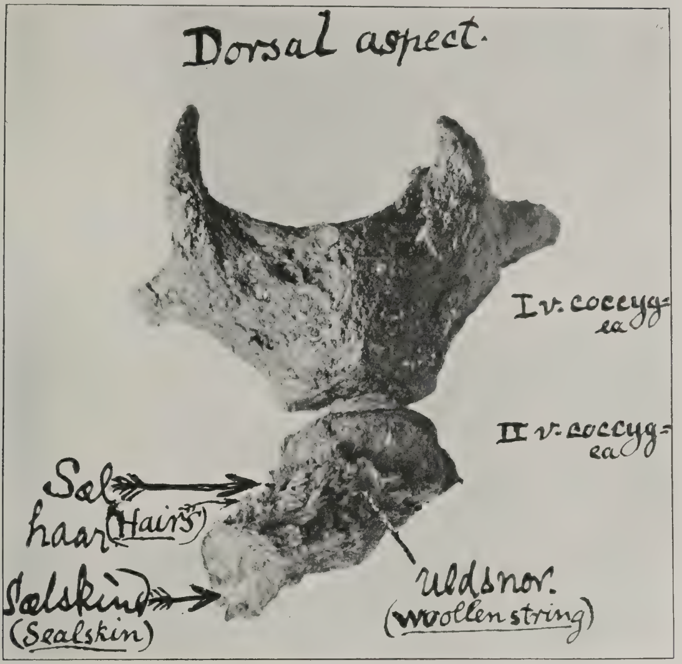

Fig. 32. $^{2}/_{1}$ nat. Os coccygis, [I+II v. cocc.] from behind.

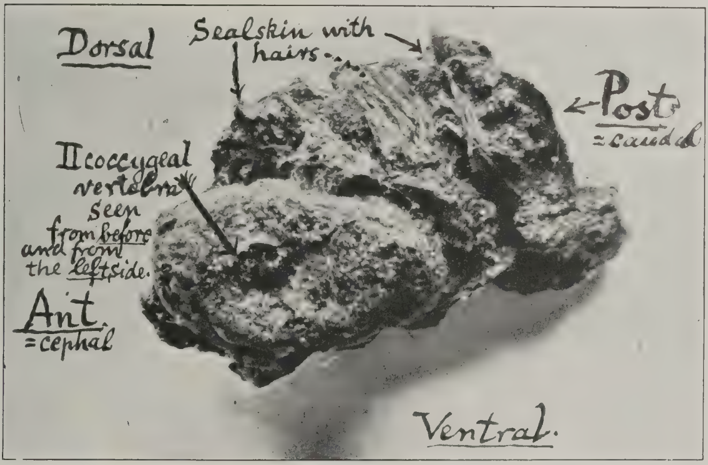
Dorsal
Sealskin with hairs
Post =caudal
II coccygeal vertebra seen from before and from the left side.
Ant. =cephal
Ventral.

Fig. 33. c. $^{3.8}/_{1}$ nat. II v. cocc. from before and from the left side.

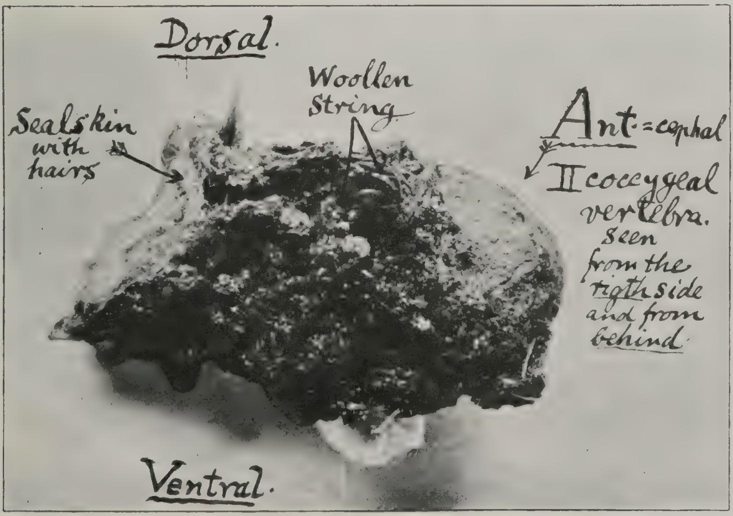
Dorsal.
Woollen String
Sealskin with hairs
Ant.=cephal
II coccygeal vertebra. Seen from the rigth side and from behind
Ventral.

Fig. 34. c. $^{3.8}/_{1}$ nat. II v. cocc. from the right side and from behind.

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Herjolfsnes I. Fig. 35–37

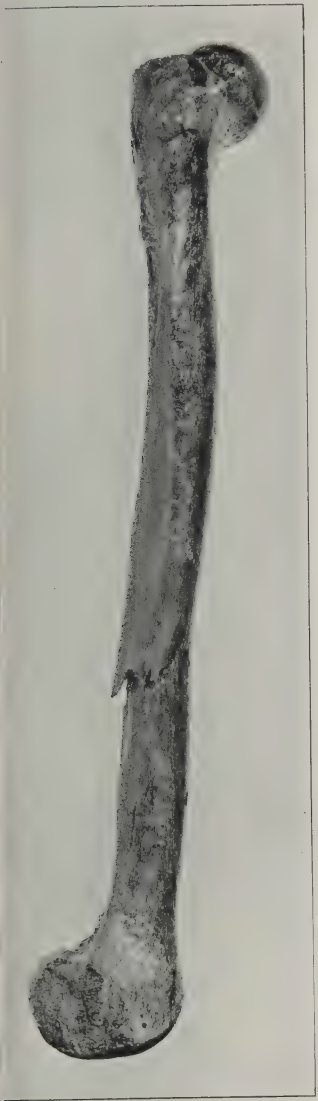

Fig. 35. 1/3 nat.
Femur dext. lateral aspect.

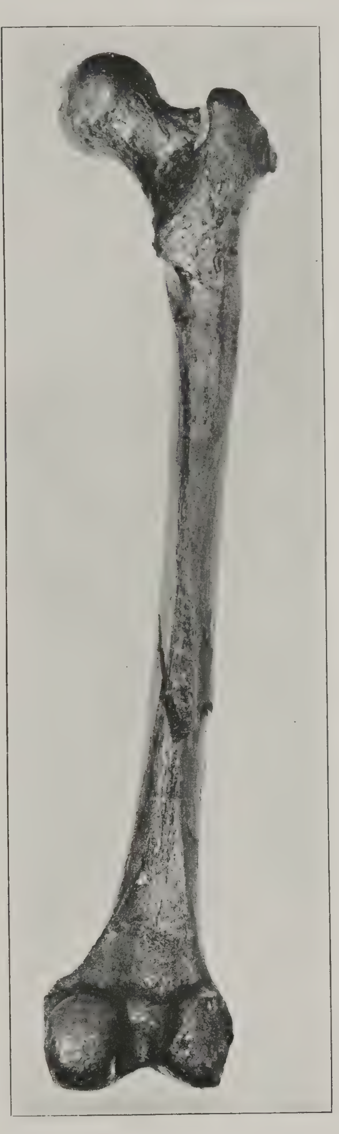

Fig. 36. 1/3 nat.
Femur dext. posterior aspect.

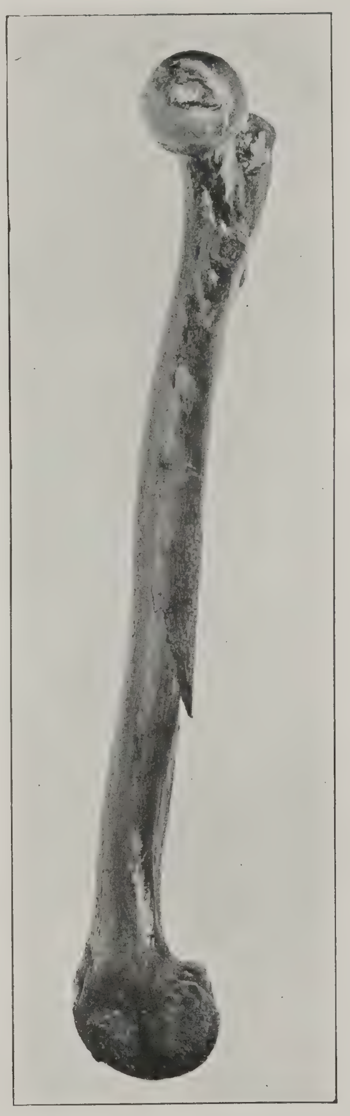

Fig. 37. 1/3 nat.
Femur dext. medial aspect.

NB. Femur dext. ant. aspect, see Fig. 1. Tabula I.

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HERJOLFSNES II.

TABULA XIII—XX

WITH

FIGURES 38—55.

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Herjolfsnes II. Fig. 38–40

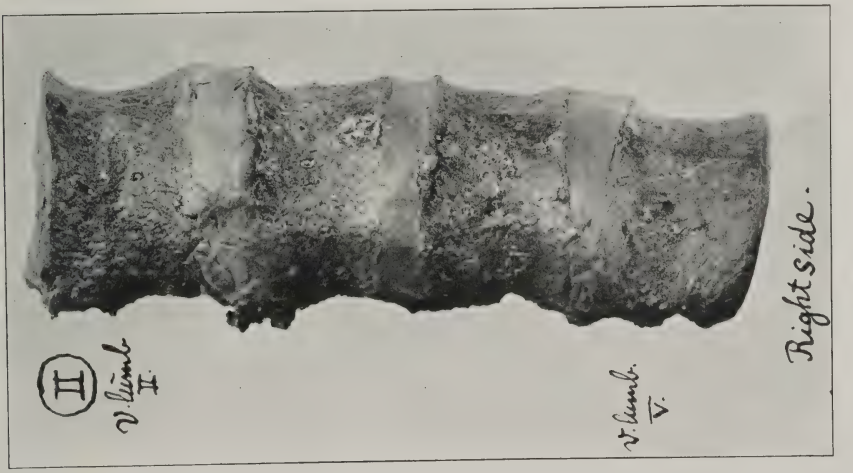

Fig. 38. 9/10 nat.

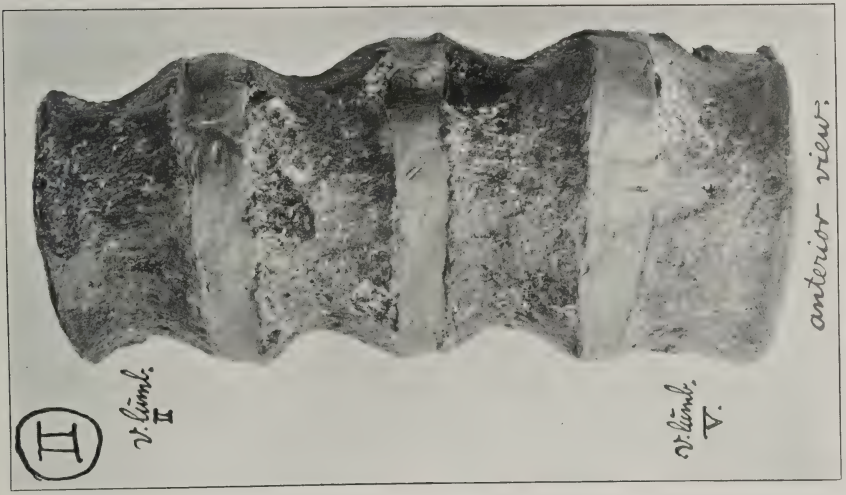

Fig. 39. 9/10 nat.

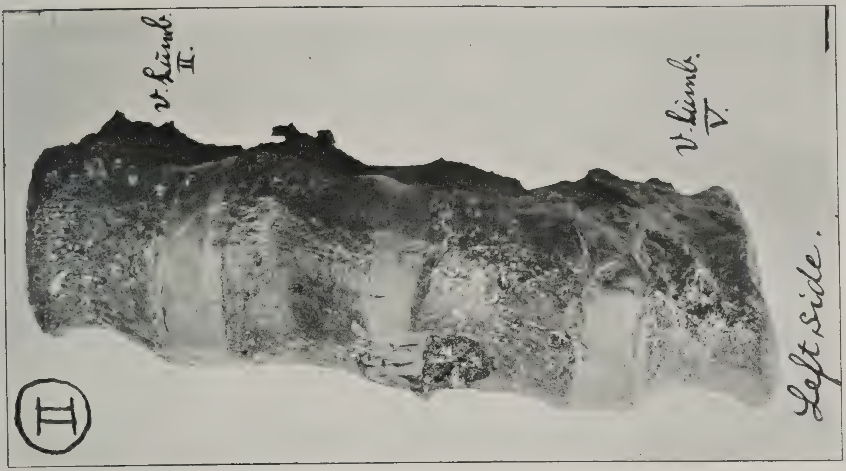

Fig. 40. 9/10 nat.

Corpora vertebr. lumb. II–V. assembled. — NB. Scoliotic deformity, note also the torsion. cp. textfig. I and II p. 307 and 313.

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Herjolfsnes II. Fig. 41

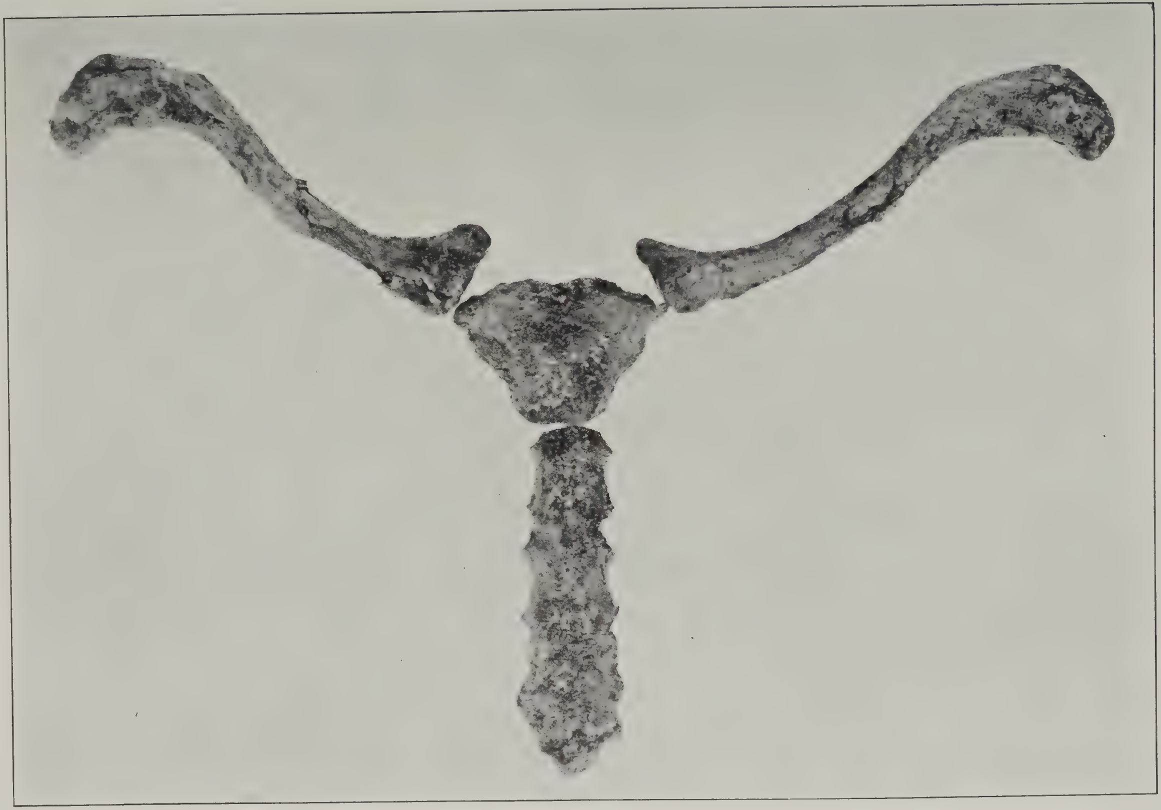

Fig. 41. $^1/_2$ nat. The sternum ant. aspect, and clavicula dext. et sin. sup. aspect.
The distance between the acromial ends of the clavicles is ab. half the distance in natural position.
NB. The right clavicle is stronger than the left.

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Herjolfsnes II. Fig. 42–43

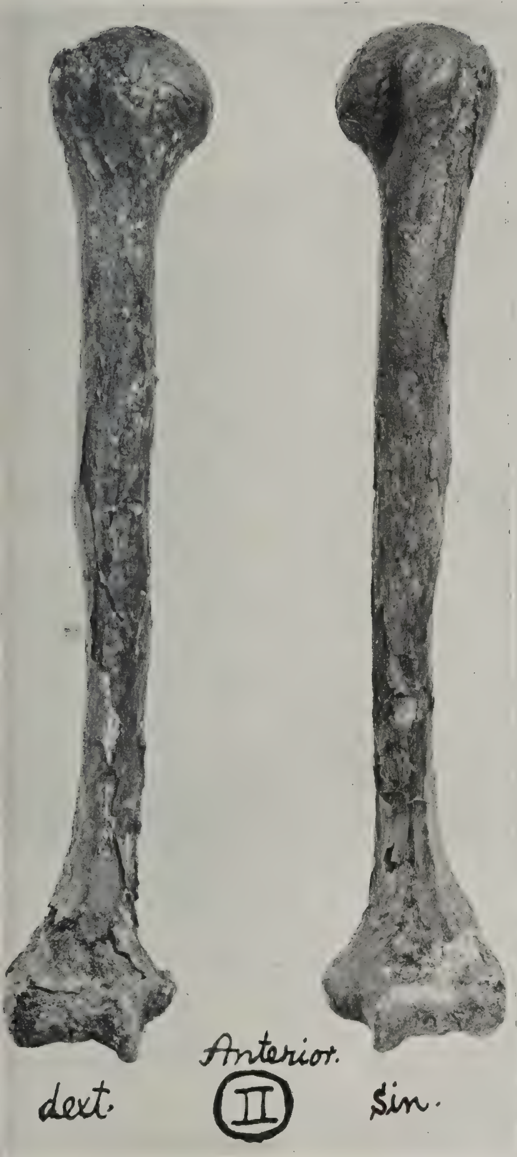

Fig. 42. $^1/_2$ nat. Humerus dext. et sin. ant. aspect.

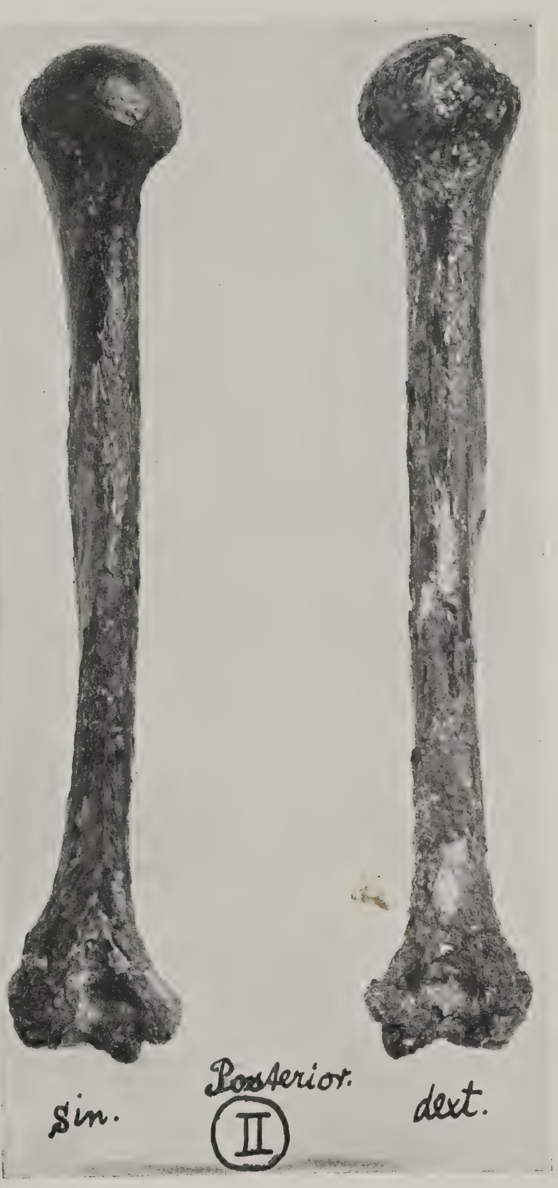

Fig. 43. $^1/_2$ nat. Humerus sin. et dext. post. aspect.

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Herjolfsnes II. Fig. 44–47

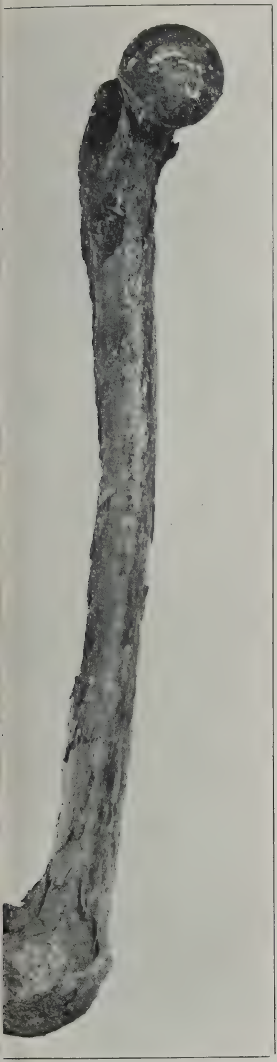


Fig. 44. 1/3 nat.
Femur sin. med. aspect.

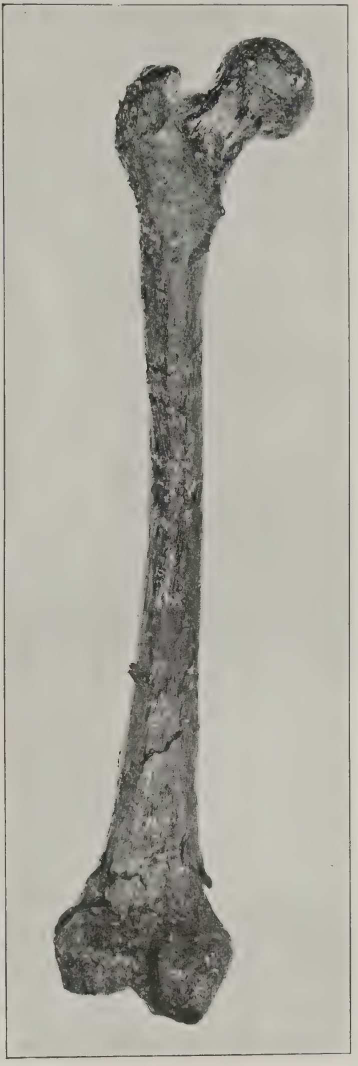


Fig. 45. 1/3 nat.
Femur sin. post. aspect.

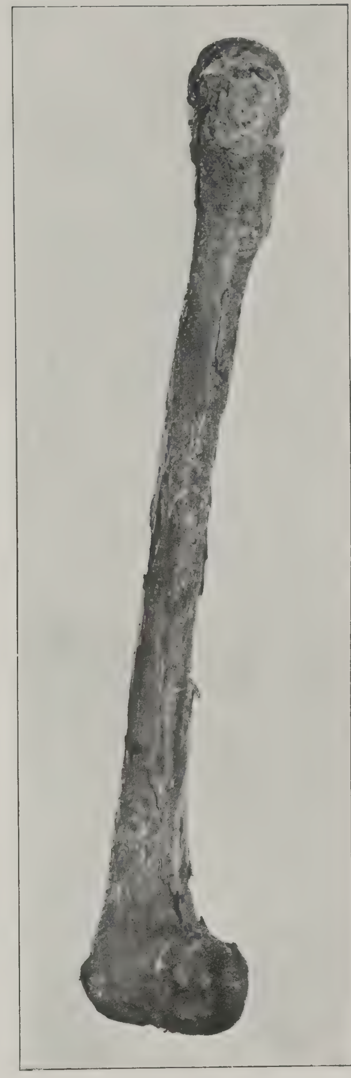
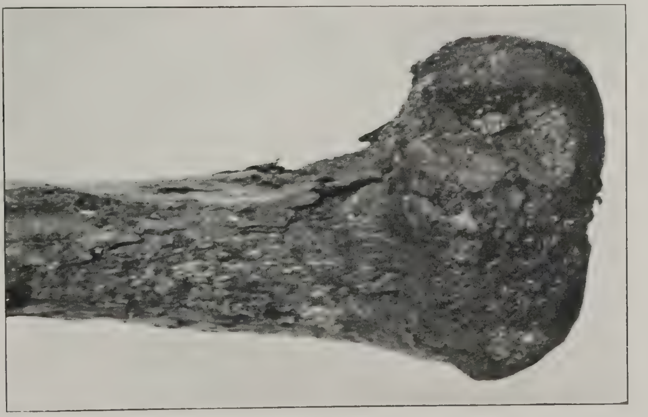


Fig. 46. 1/3 nat.
Femur sin. lat. aspect.

Femur sin. ant. aspect. see Tabula I.



← Sulcus for the tendon of musculus popliteus.

Fig. 47. 3/4 nat. Femur sin. Condylus lateralis.

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Herjolfsnes II. Fig. 48–49

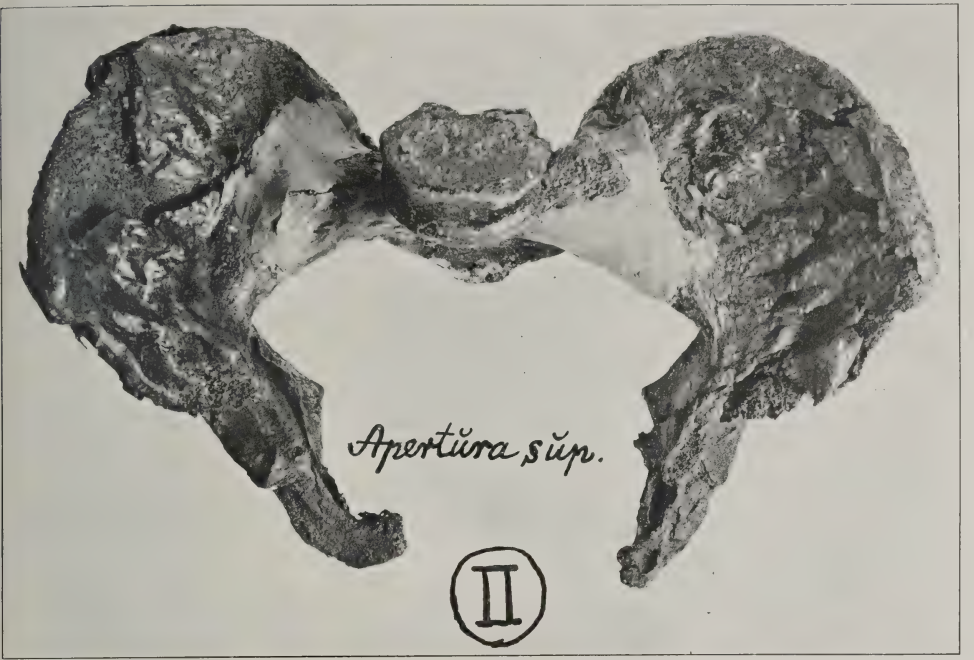

Fig. 48. $^5/_{12}$ nat. Pelvis, flat rachitic, asymmetric, with corpus of 5th lumbar vertebra, from abowe.

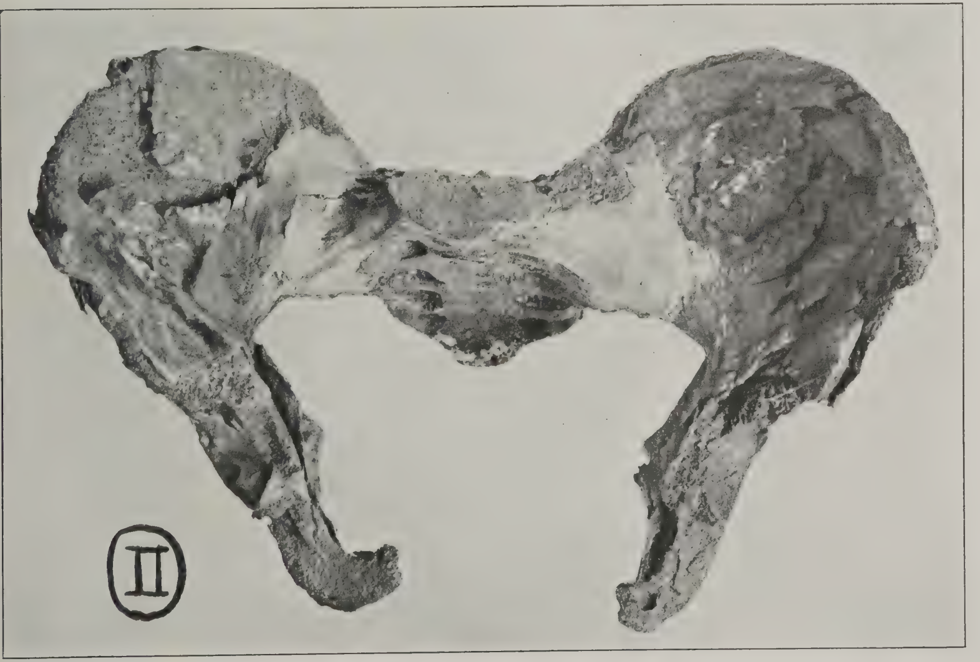

Fig. 49. $^5/_{12}$ nat. Pelvis, flat. rachitic, asymmetric. Inferior aperture enlarged. From above and from before.

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Herjolfsnes II. Fig. 50–51

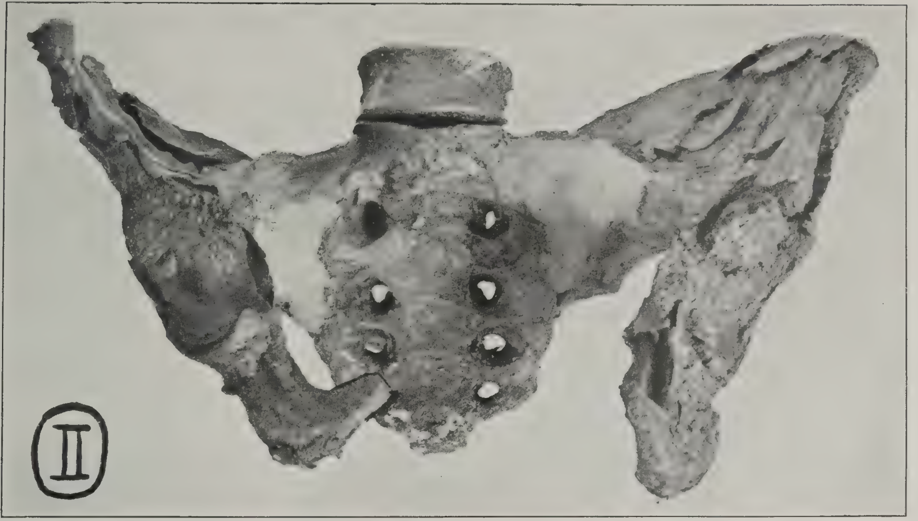

Fig. 50. $^5/_{12}$ nat. Pelvis, flat, rachitic, asymmetric, with corpus of 5th lumbar vertebra; some scoliosis of os sacrum. From before.

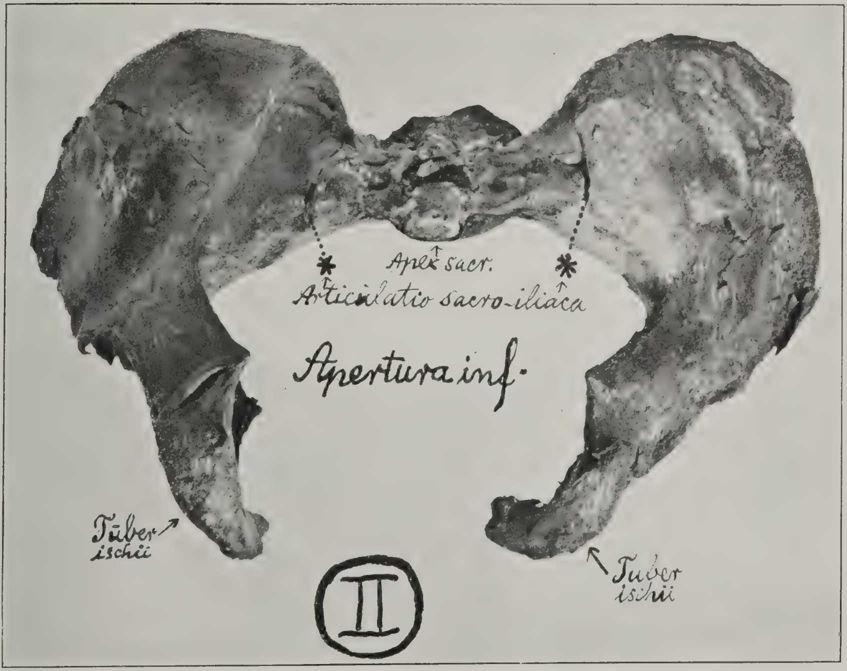

Fig. 51. $^5/_{12}$ nat. Pelvis, flat rachitic asymmetric. Inferior aperture enlarged.

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Herjolfsnes II. Fig. 52–53

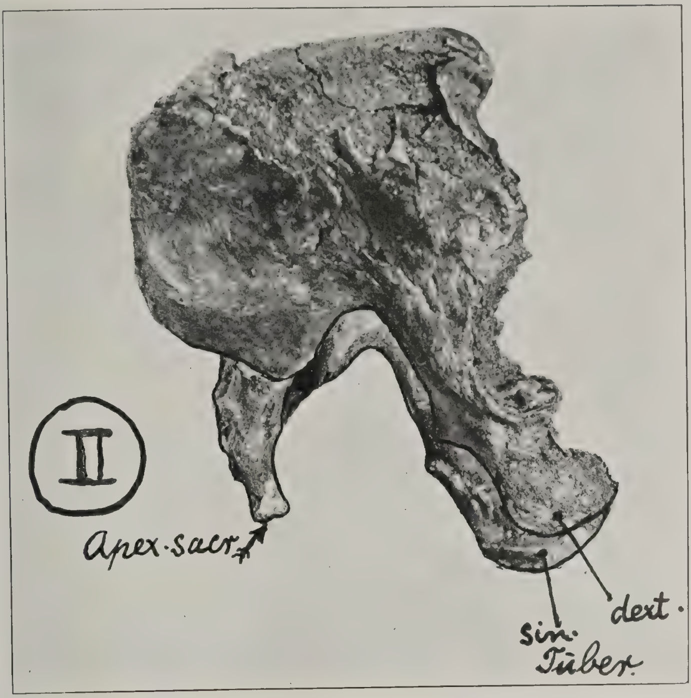

Fig. 52. $^5/_{12}$ nat. Pelvis from the right side.
NB. The great distance between apex ossis sacri and tubera ischii!

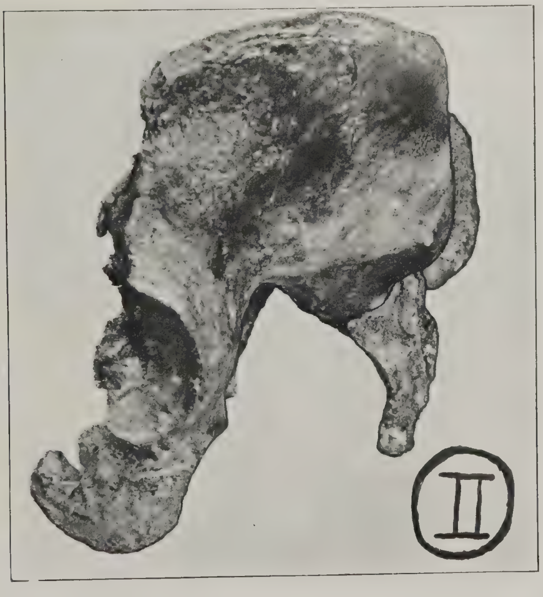

Fig. 53. $^5/_{12}$ nat. Pelvis from the left side.
NB. The great distance between apex ossis sacri and tubera ischii!

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Herjolfsnes II. Fig. 54—55

NB. Extra deep.
impression for os
sacrum behind
the facies
auricularis. ➤

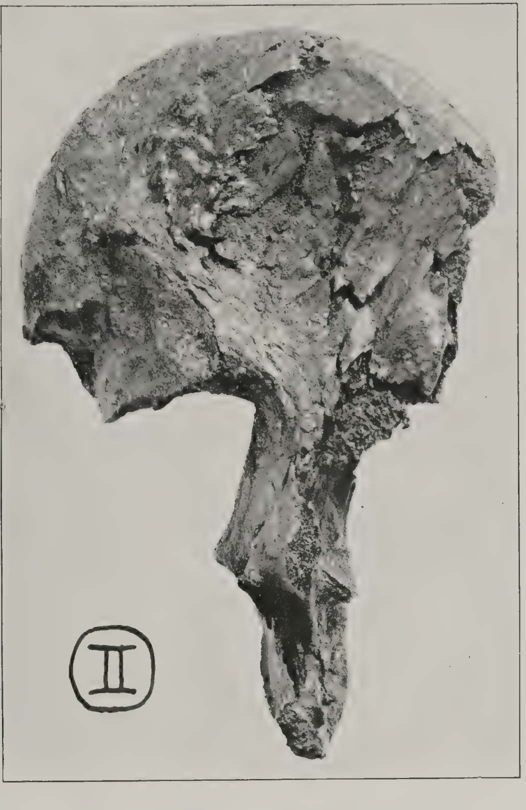

Fig. 54. 1/2 nat. Os coxæ sin. medial facies.

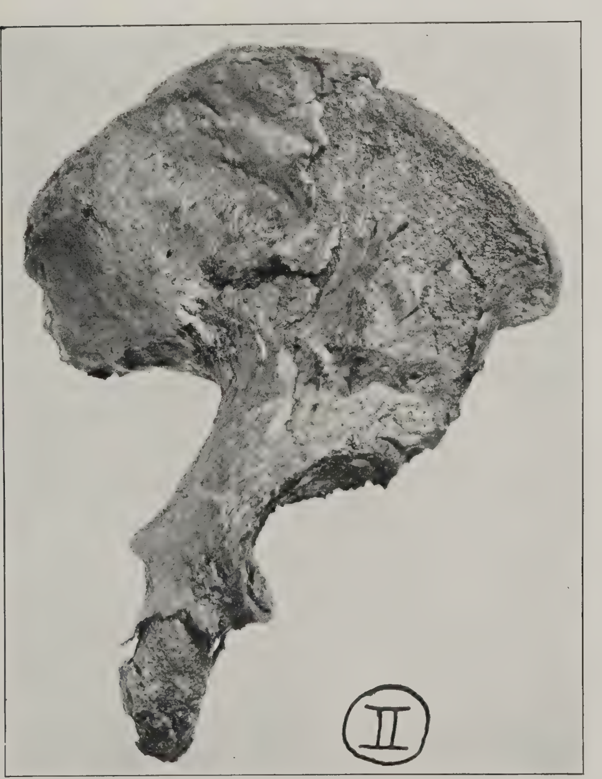

Fig. 55. 1/2 nat. Os coxæ dext. lateral facies.

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TABULA XXI—XXX

WITH

FIGURES 56—86

Herjolfsnes X. Fig. 56–60

Acromion sin.		Acromion dext + clavicula dext.

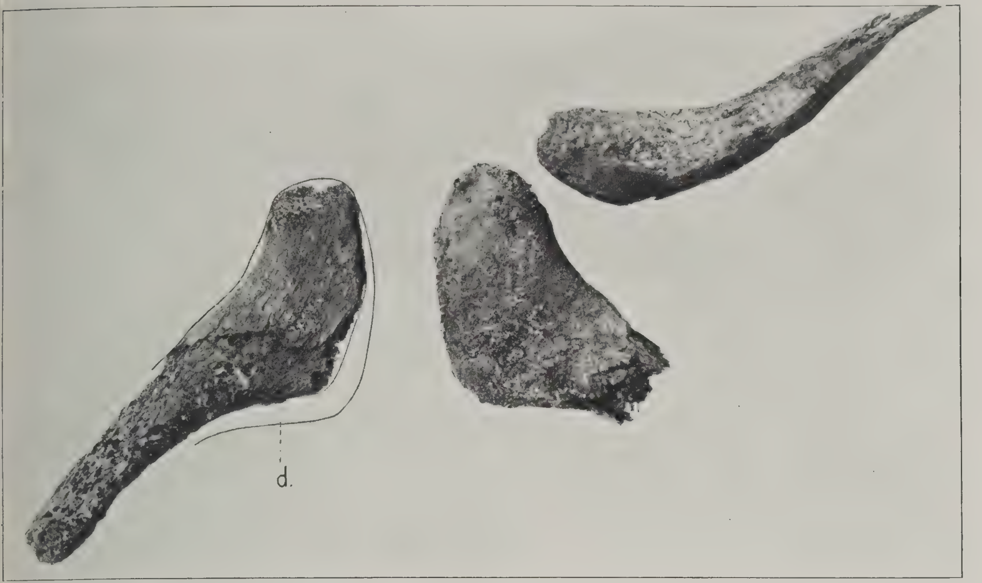
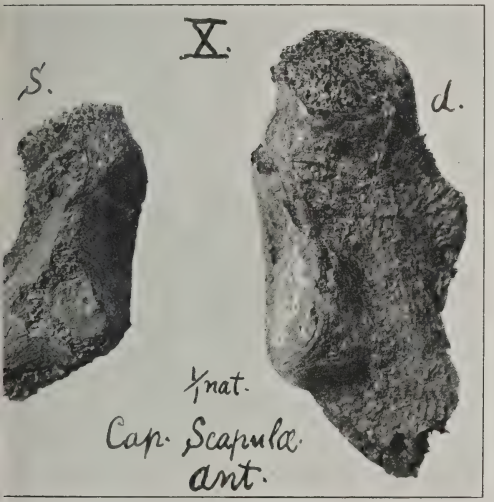


Fig. 56. $^1/_1$ nat. Atrophy of acromion sin. with the outline d. of acromion dext. Inferior aspect.



57. $^1/_1$ nat. Cap. scapulæ sin. et dext. Cloth adherent! Ant. aspect.

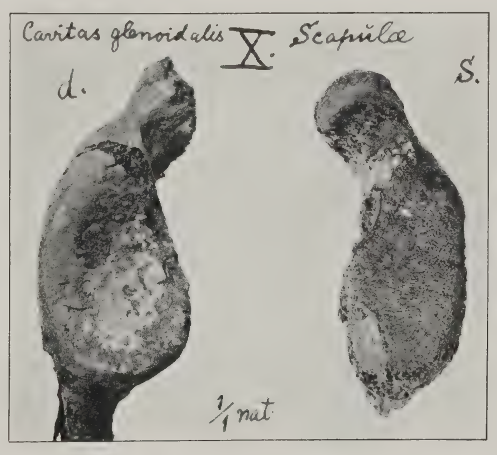


Fig. 58. $^1/_1$ nat. Cavitas glenoidalis scapulæ dext. et sin., dext. much larger!

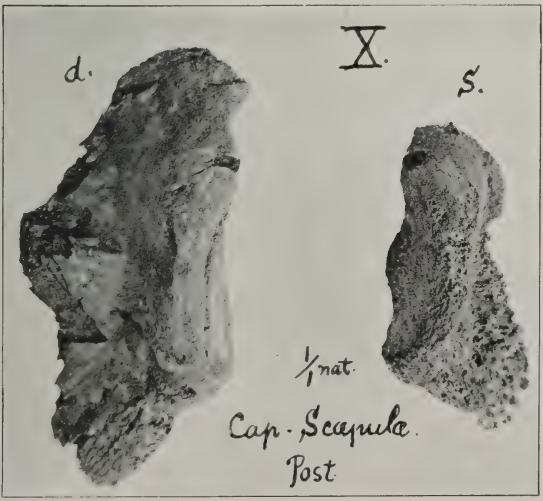


Fig. 59. $^1/_1$ nat. Cap. scapulæ dext. et sin. Post aspect.

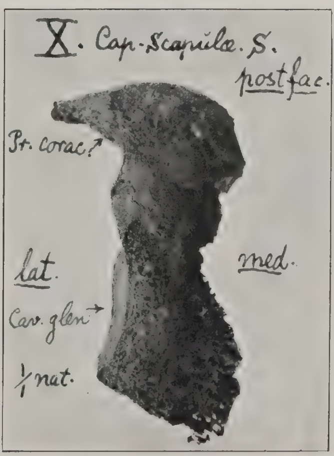


Fig. 60. $^1/_1$ nat. Cap. scapulæ sin. with pr. coracoideus. Post. aspect.

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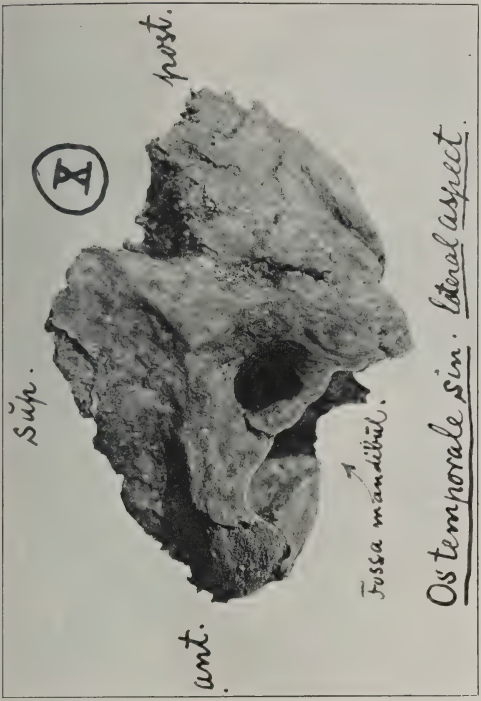
Herjolfnes X. Fig. 61–64



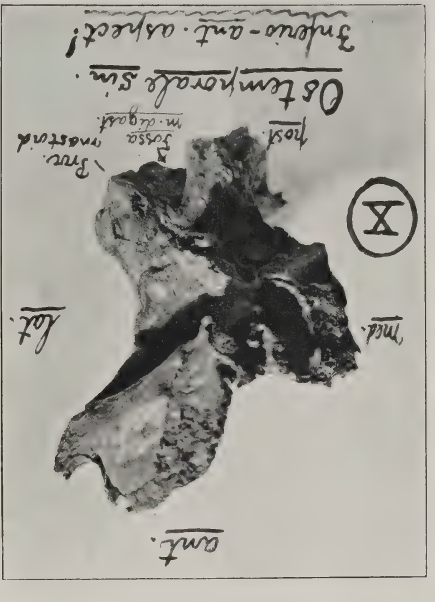
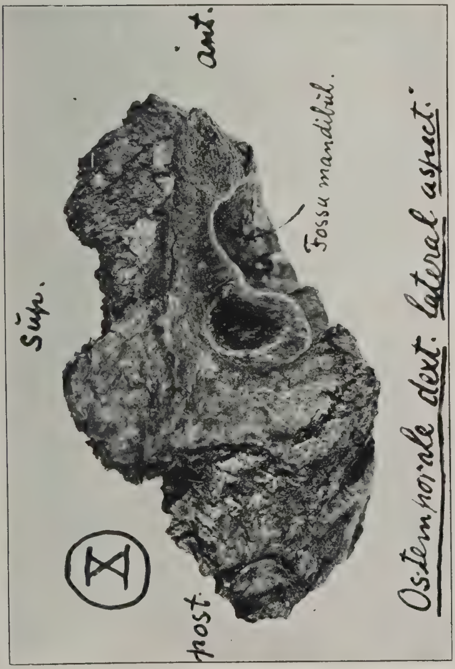


Fig. 61. $^1/_1$ nat. Os temporale sin. Lat. aspect.

Fig. 62. $^1/_1$ nat. Os temporale sin. Inf. aspect.

NB. In Fig. 61 and 62. Fossa mandibularis sin. much expanded on the left temporal bone!



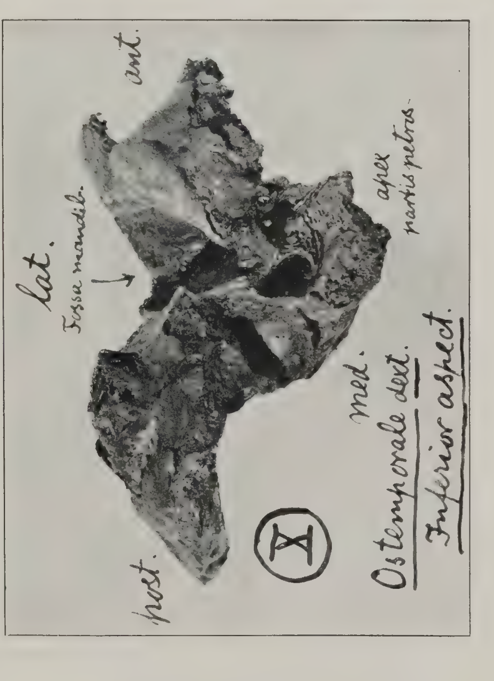


Fig. 63. $^1/_1$ nat. Os temporale dext. Lat. aspect.

Fig. 64. $^1/_1$ nat. Os temporale dext. Inf. aspect.

NB. In fig. 63 and 64. Fossa mandibularis dext. narrower in sagittal direction than in the left temporal bone.

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Herjolfsnes X. Fig. 65–66 a. b.

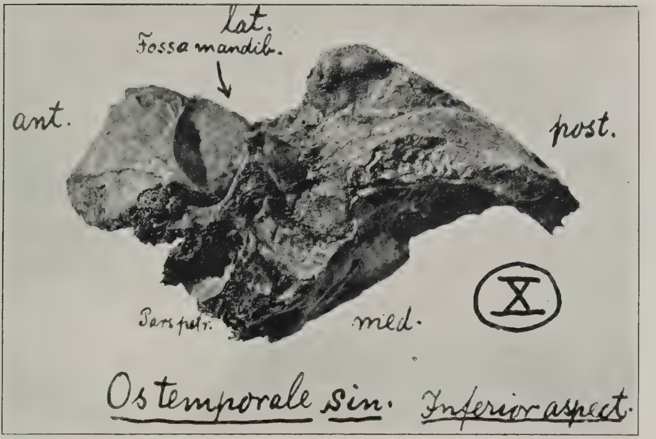

Fig. 65. 1/1 nat. Os temporale sin. Inferior and posterior aspect.
NB. Foramen caroticum ext., fossa m. digastrici.

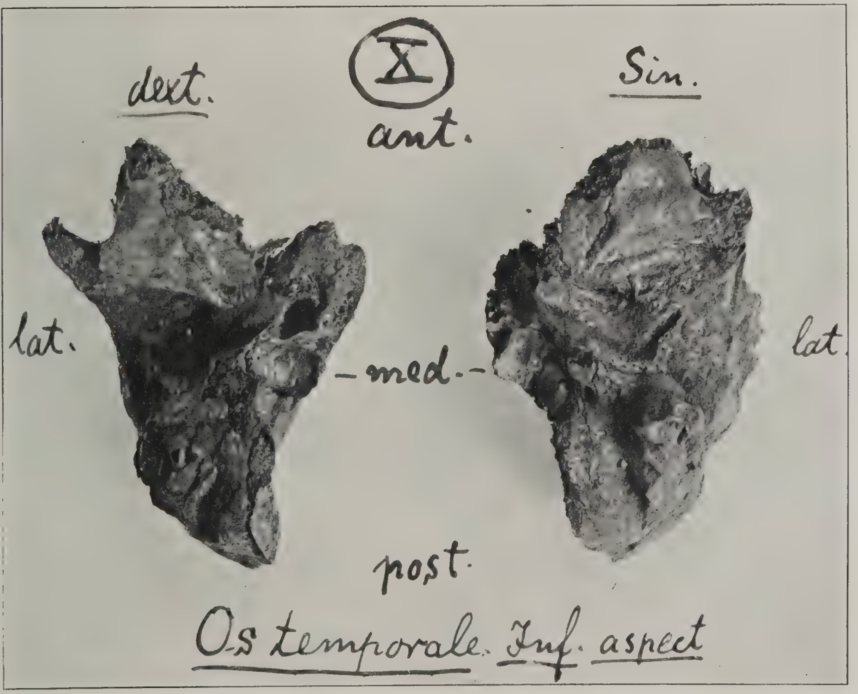

Fig. 66 a. b. ca. 9/10 nat. Ossa temporalia. Facies inferior.
NB. The difference between proc. mastoidei a. o.

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Herjolfsnes X. Fig. 67–70.

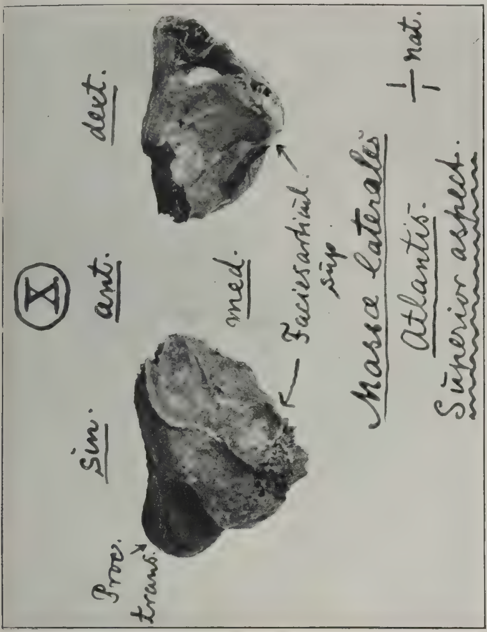


Fig. 67. $^1/_1$ nat. Atlas, massæ lateralis dext. et sin. From above.

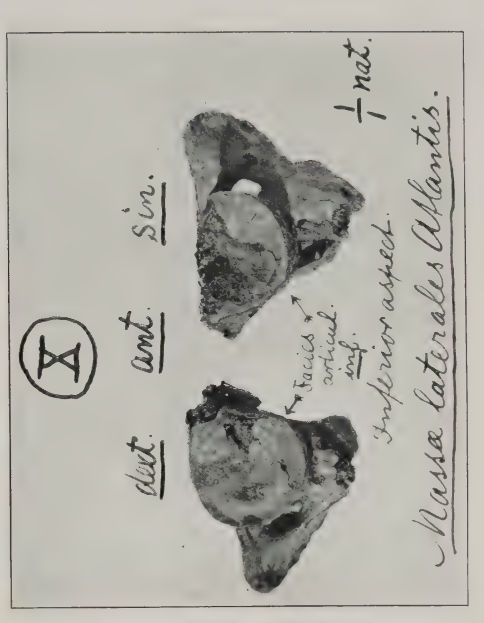
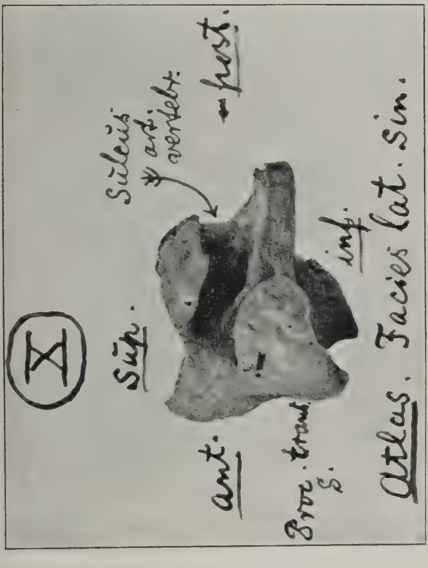


Fig. 68. $^1/_1$ nat. Atlas, massæ lateralis dext. et sin. From below.



g. 69. $^5/_4$ nat. Atlas, massa lateralis sin. Lateral aspect. Note deep sulcus arteriæ vertebralis !

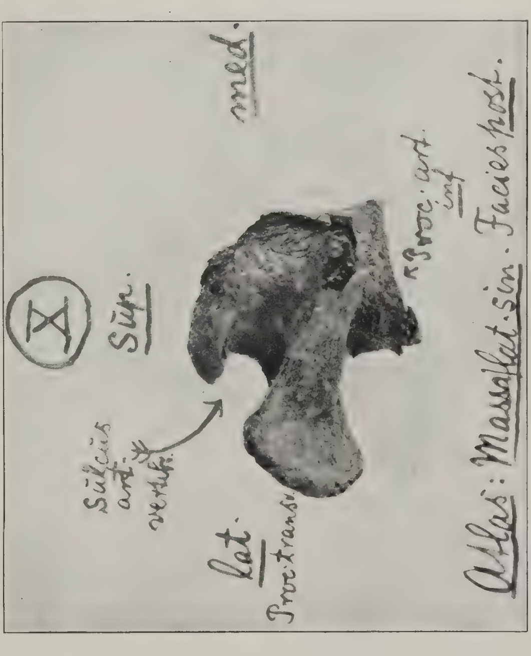


Fig. 70. $^5/_4$ nat. Atlas, massa lateralis sin. From behind.

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Herjolfsnes X. Fig. 71–72

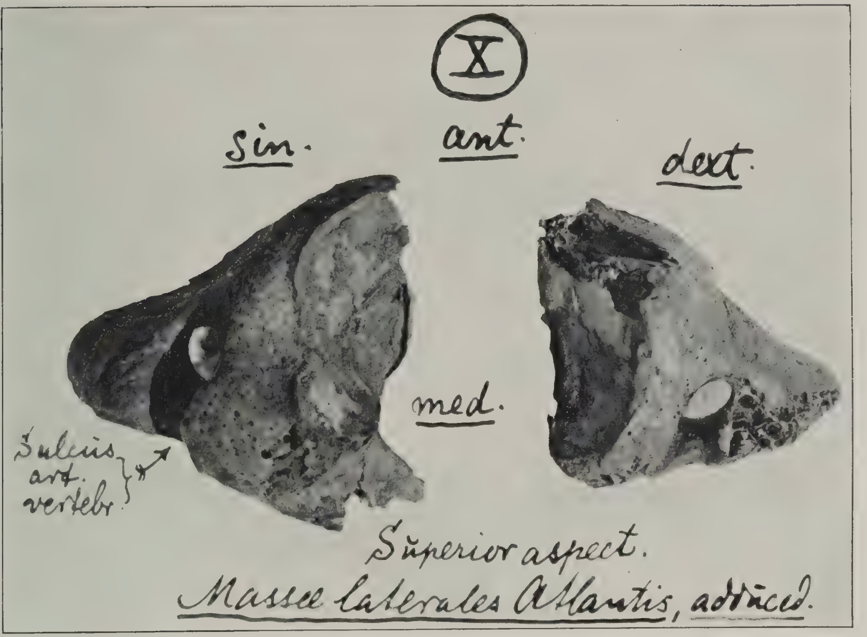

Fig. 71. $^5/_3$ nat. Massæ laterales Atlantis, adduced. Superior aspect.

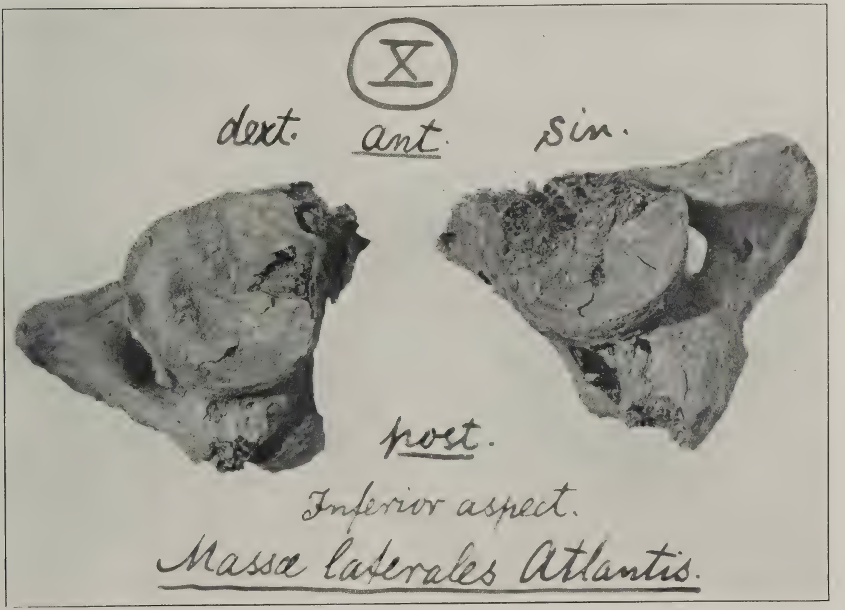

Fig. 72. $^5/_3$ nat. Massæ laterales Atlantis. Inferior aspect.

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Herjolfsnes X. Fig. 73–78.

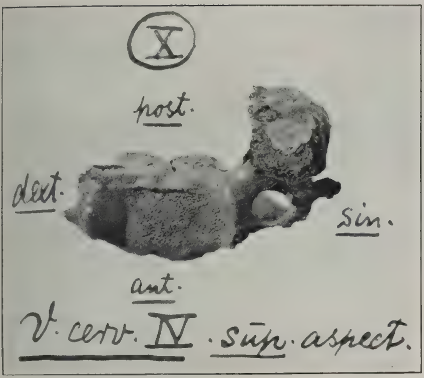

Fig. 73. $^{1}/_{1}$ nat. V. cervic. IV. sup. aspect.

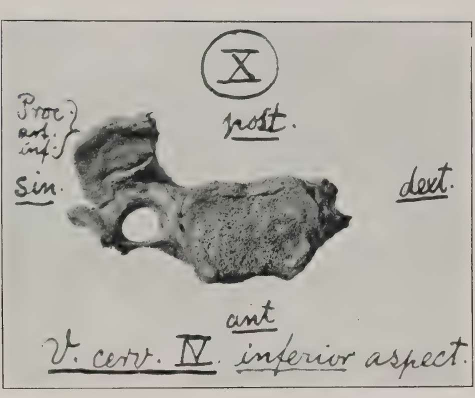

Fig. 74 $^{1}/_{1}$ nat. V. cervic. IV. inf. aspect.

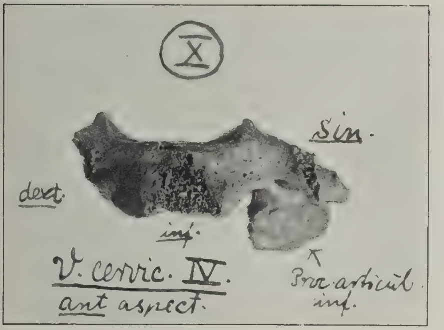

Fig. 75. $^{1}/_{1}$ nat. V. cervic. IV. ant. aspect.

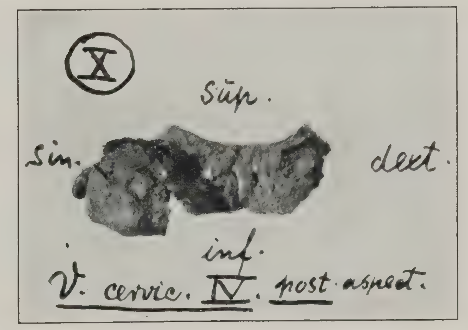

Fig. 76. $^{1}/_{1}$ nat. V. cervic. IV. post. aspect.

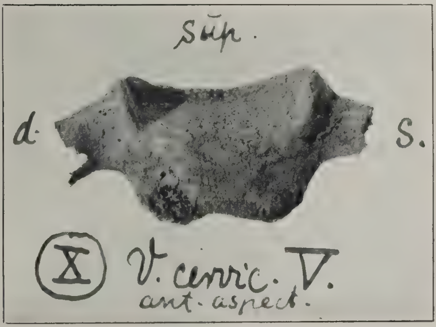

Fig. 77. $^{5}/_{4}$ nat. V. cervic. V. ant. aspect.
NB. Impression-facet on the
ant. sup. border.

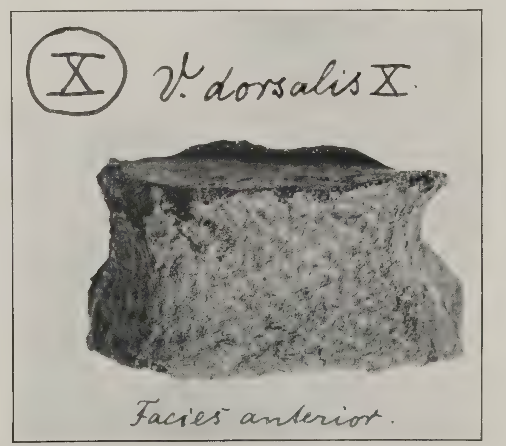

Fig. 78. $^{5}/_{3}$ nat. V. dorsalis X. ant. facies.
NB. Cloth of hemp on the surface.

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Herjolfsnes X. Fig. 78–81^{a}.

Columna vertebralis cervicalis 2^{d} V. C. → 1st V. D.

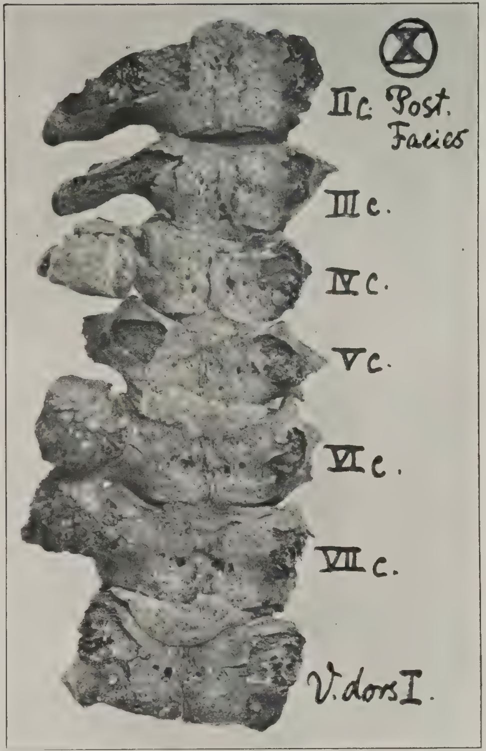

Fig. 81 a. $^{1}/_{1}$ nat. *Posterior facies.*
Note: the concavity on the left side.

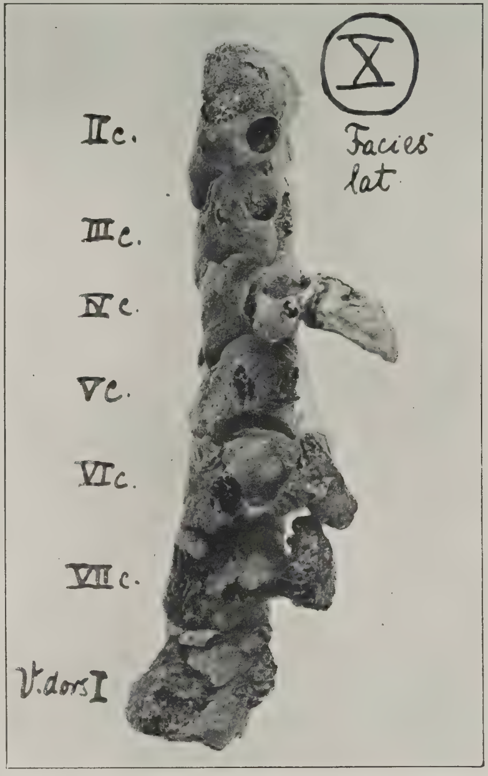

Fig. 80. $^{1}/_{1}$ nat. *Lateral facies. (left).*
Note! the anterior concavity espec. in relation to the I dorsal vertebra!

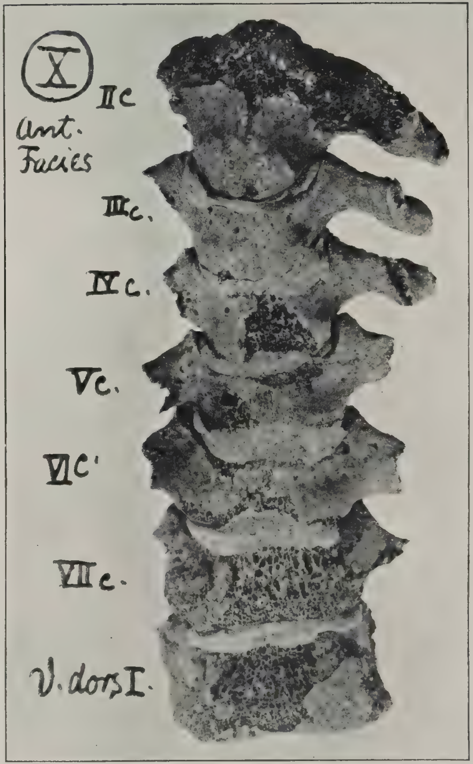

Fig. 79. $^{1}/_{1}$ nat. *Anterior facies.*
Note! The asymmetry and concavity with ant. torsion on the left side.

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Herjolfsnes X. Fig. 81b—82

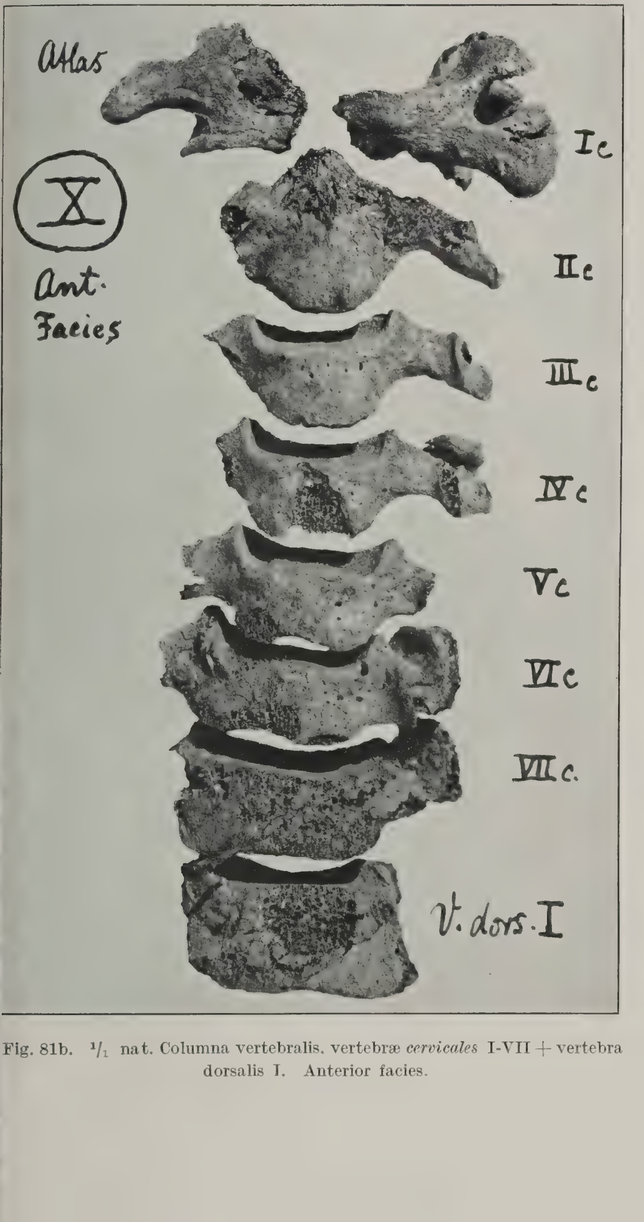

Fig. 81b. $^1/_1$ nat. Columna vertebralis, vertebræ *cervicales* I-VII + vertebra dorsalis I. Anterior facies.

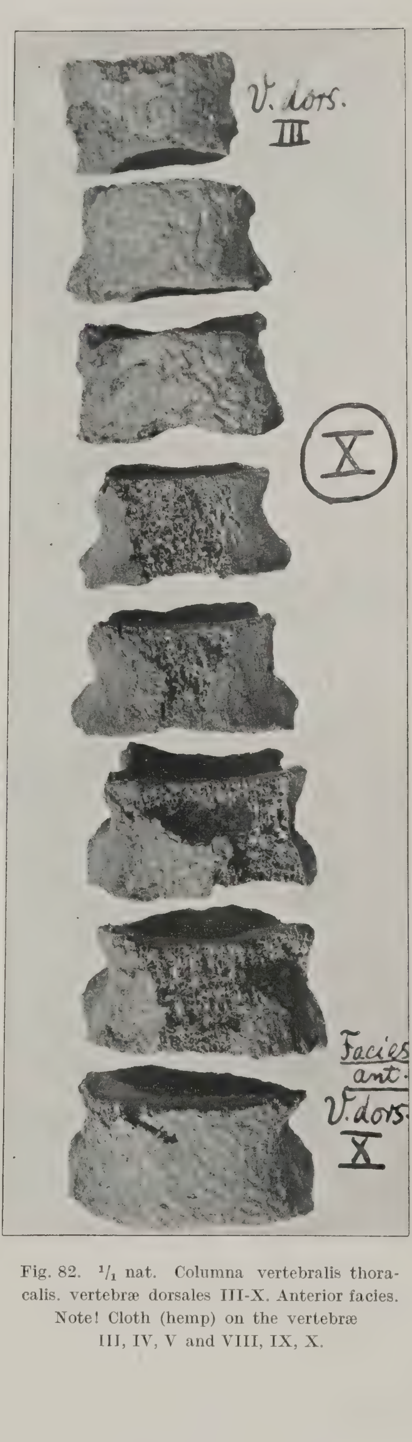

Fig. 82. $^1/_1$ nat. Columna vertebralis thoracalis. vertebræ dorsales III-X. Anterior facies. Note! Cloth (hemp) on the vertebræ III, IV, V and VIII, IX, X.

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Herjolfsnes X

Columna vertebralis cervicalis v. c. I-VII + v. d. I. Fig. 83–84

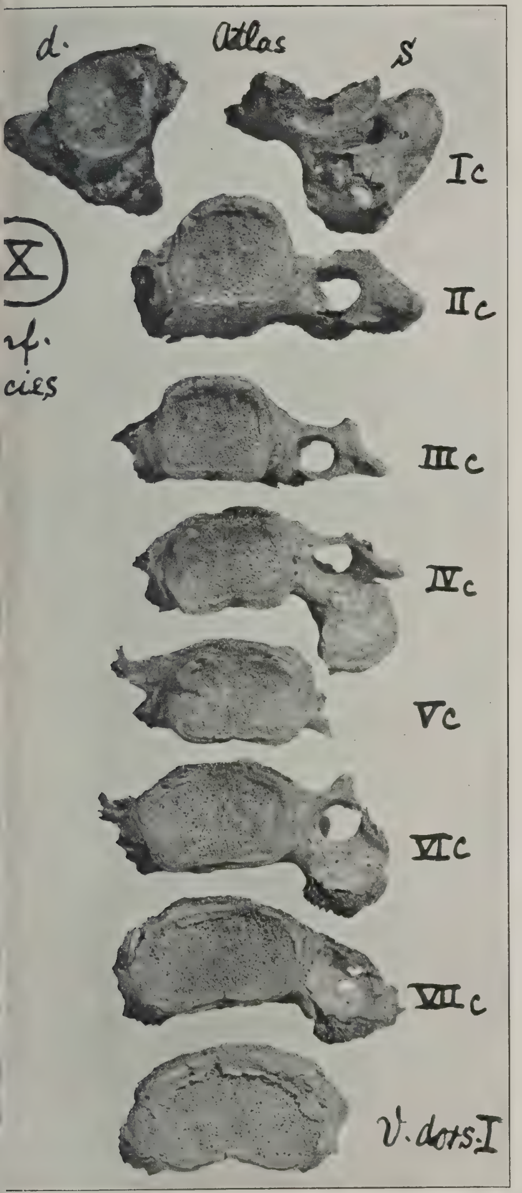

Fig. 83. 1/1 nat. *Facies inferior.*
Anterior border of corpora above.

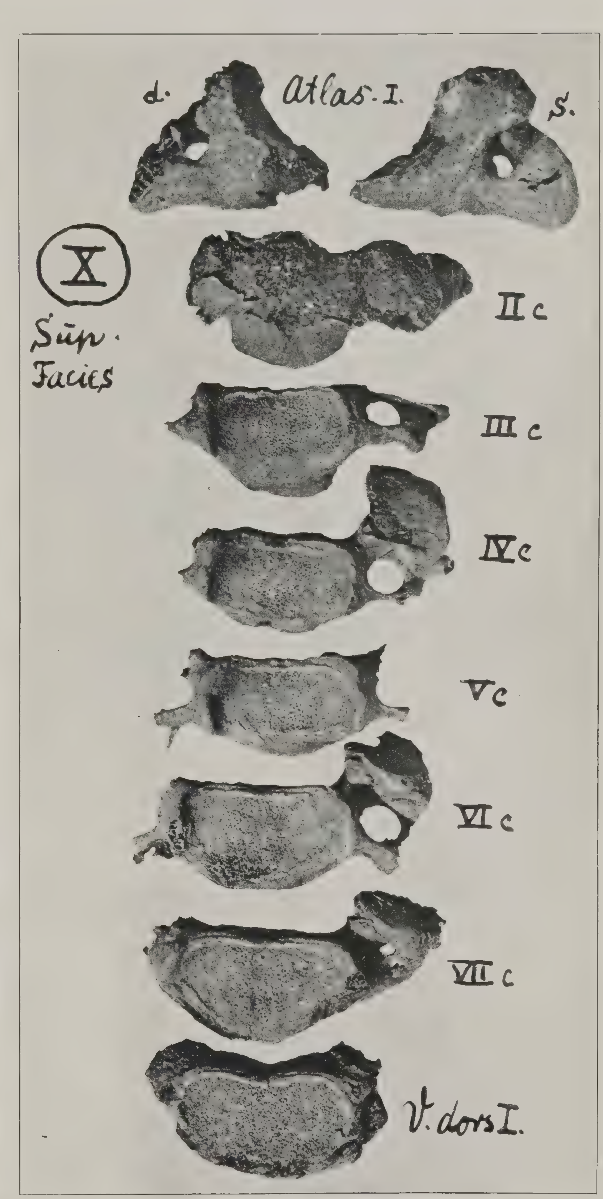

Fig. 84. 1/1 nat. *Facies superior.*
Anterior border of corpora below.

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Herjolfsnes X. Fig. 85–86

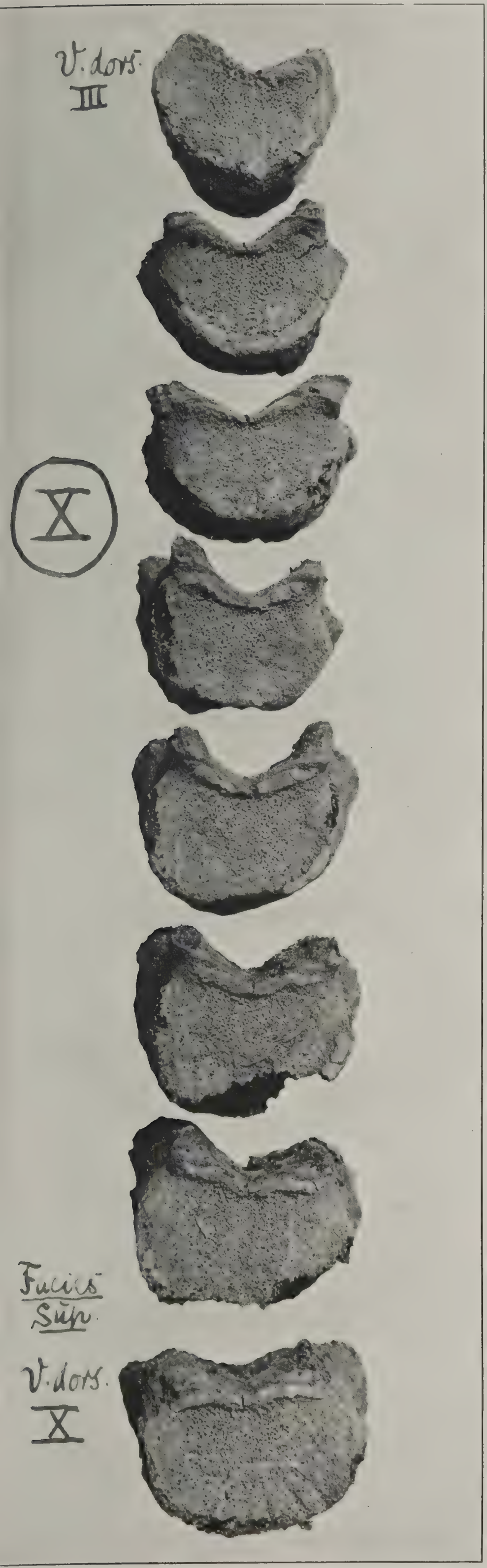

Fig. 85. $^1/_1$ nat. Facies sup. vertebr.

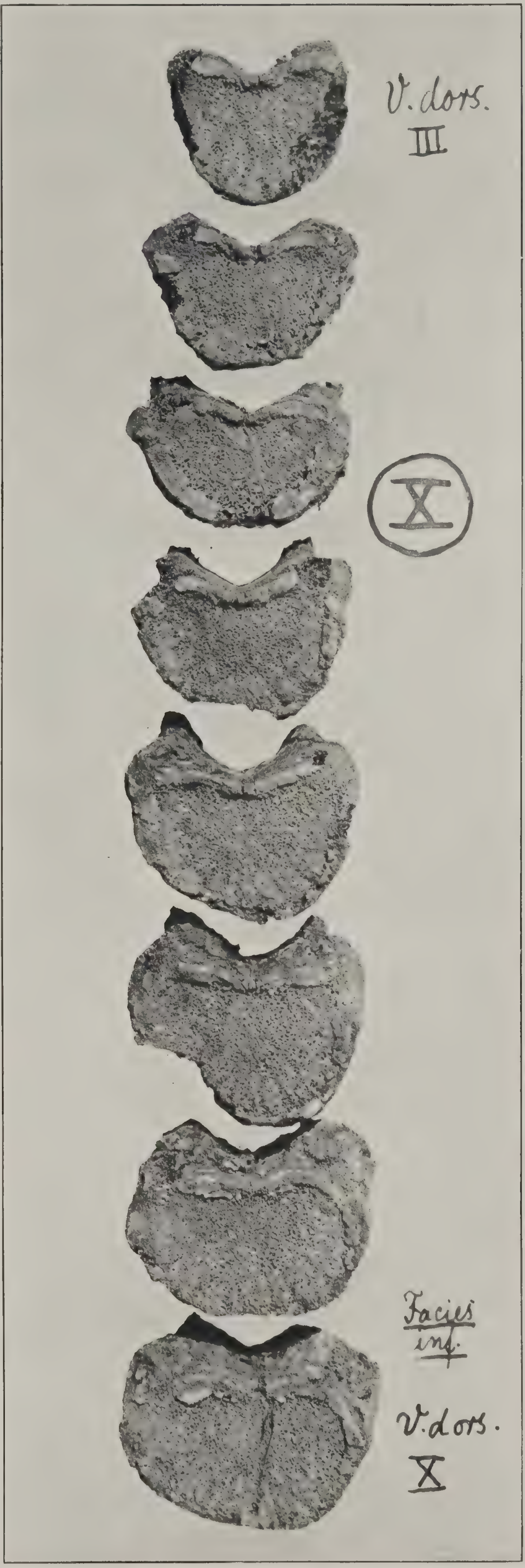

Fig. 86. $^1/_1$ nat. Facies inf. vertebr.

Columna vertebralis thoracalis v. d. III—X.

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HERJOLFSNES XV.

TABULA XXXI—XXXVIII

WITH

FIGURES 87—113.

Herjolfsnes XV. Fig. 87–92

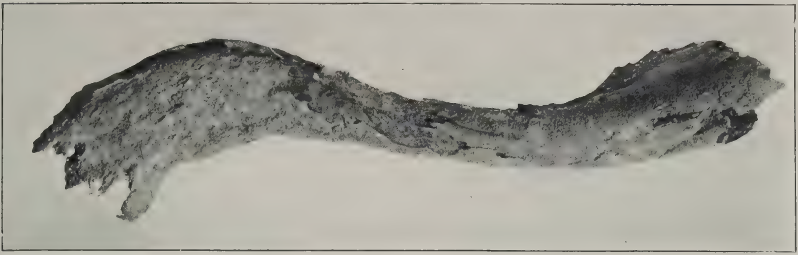

Fig. 87. $^1/_1$ nat. Clavicula dext. sup. aspect.

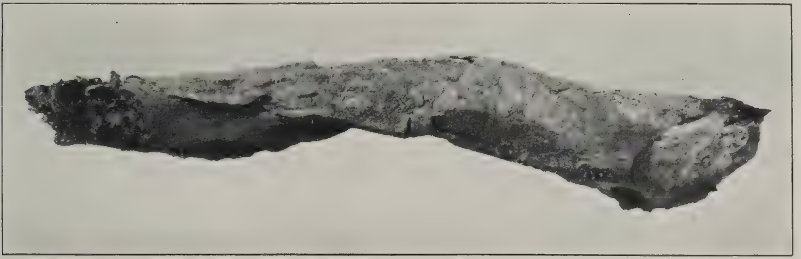

Fig. 88. $^1/_1$ nat. Clavicula dext. ant. aspect.

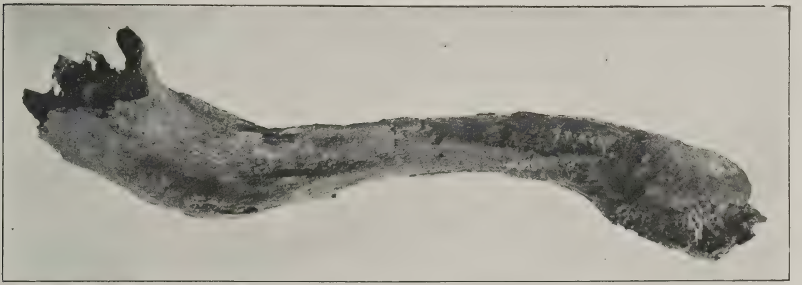

Fig. 89. $^1/_1$ nat. Clavicula dext. inf. aspect.

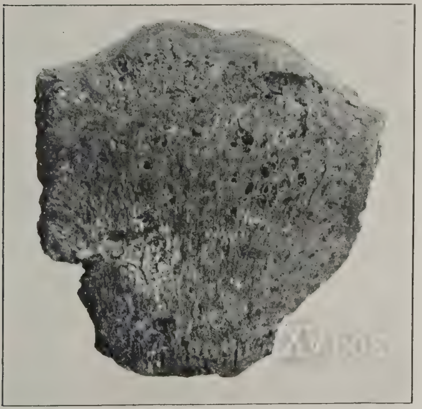

Fig. 90. $^1/_1$ nat. Manubrium sterni, post. facies.

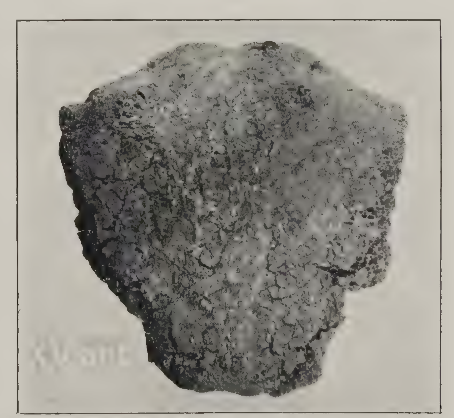

Fig. 91. $^1/_1$ nat. Manubrium sterni, ant. facies.

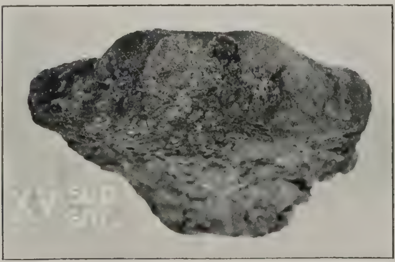

Fig. 92. $^1/_1$ nat. Manubrium sterni,
Sup. ant. aspect.

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Herjolfsnes XV. · Fig. 93–97

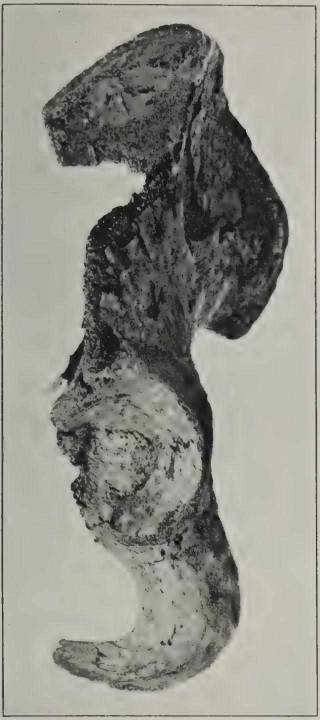


Fig. 93. $^{1}/_{3}$ nat.
os coxæ sin. ant. aspect. XV.

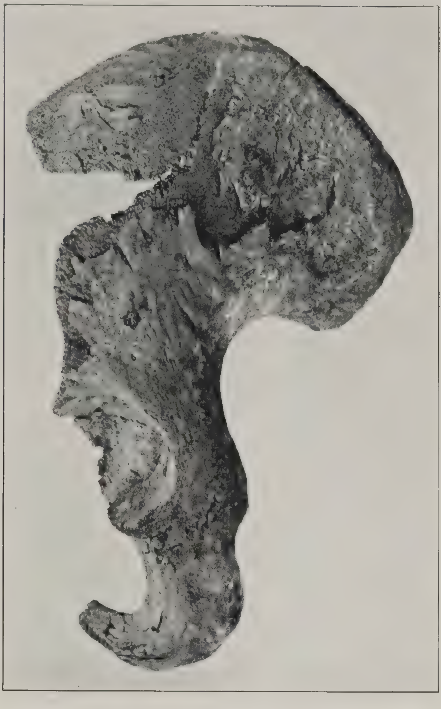


Fig. 94. $^{1}/_{3}$ nat. os coxæ sin. lat. aspect. XV.

sin.
post.
facies.

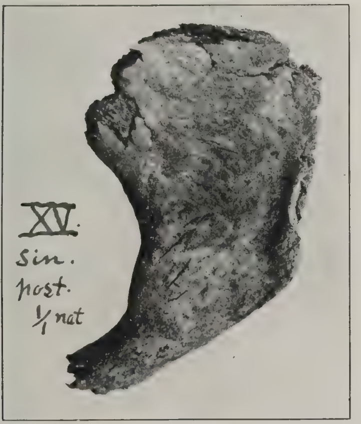


Fig. 95. $^{1}/_{1}$ nat.
Os pubis, pars symphysis.

sin.
ant.
facies.

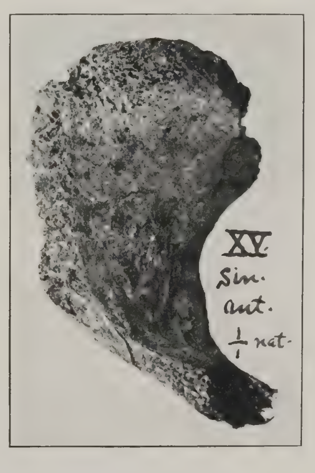
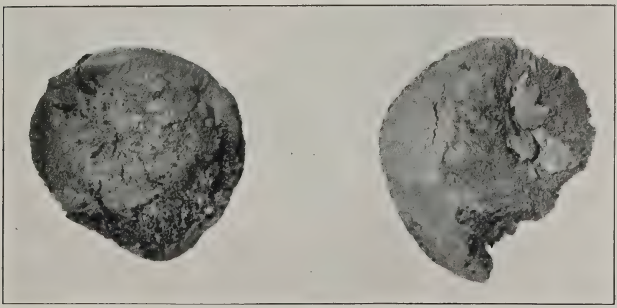


Fig. 96. $^{1}/_{1}$ nat.
Os pubis, pars symphysis.

sin.



dext.

Fig. 97. $^{1}/_{1}$ nat. Patellæ post. aspect. XV.

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Herjolfsnes XV. Fig. 98–100

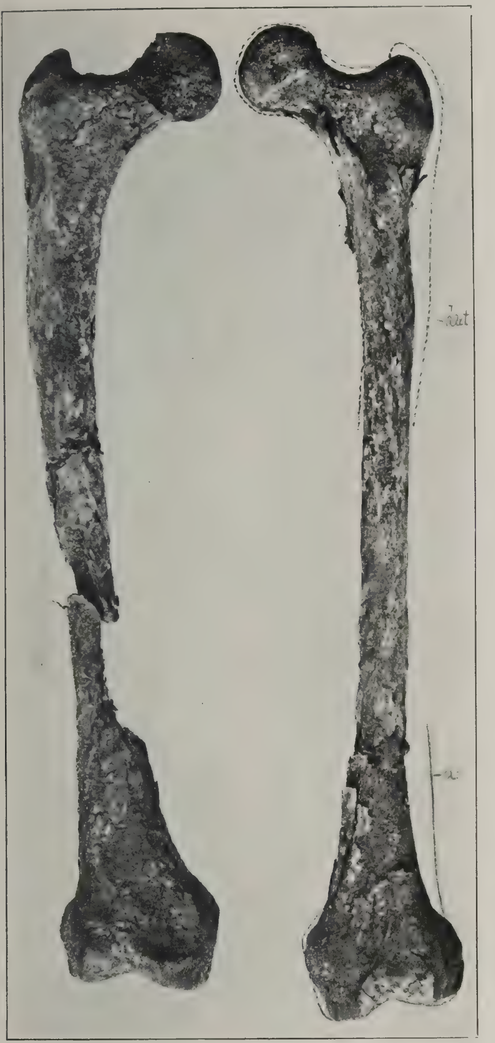
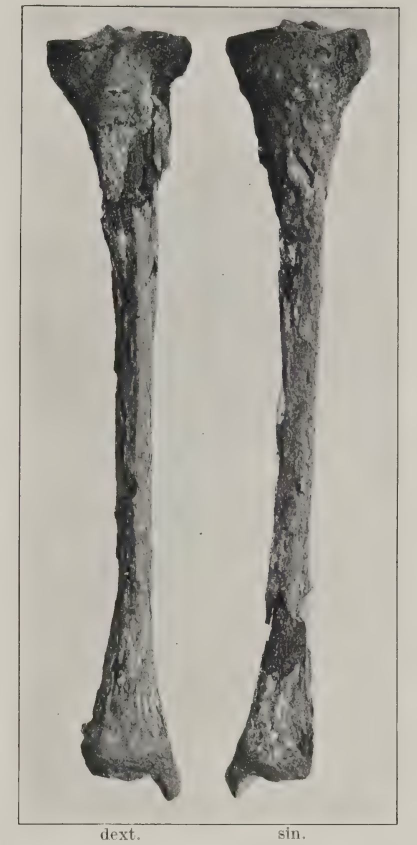


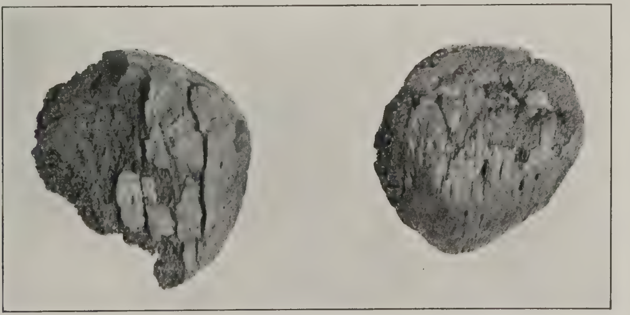
Fig. 98. 1/2 nat. Femora. ant. aspect.



dext. sin.

Fig. 99. 1/3 nat. Tibiæ ant. aspect.

dext.



sin.

Fig. 100. 1/1 nat. Patellæ ant. aspect.

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Herjolfsnes XV. Fig. 101–102

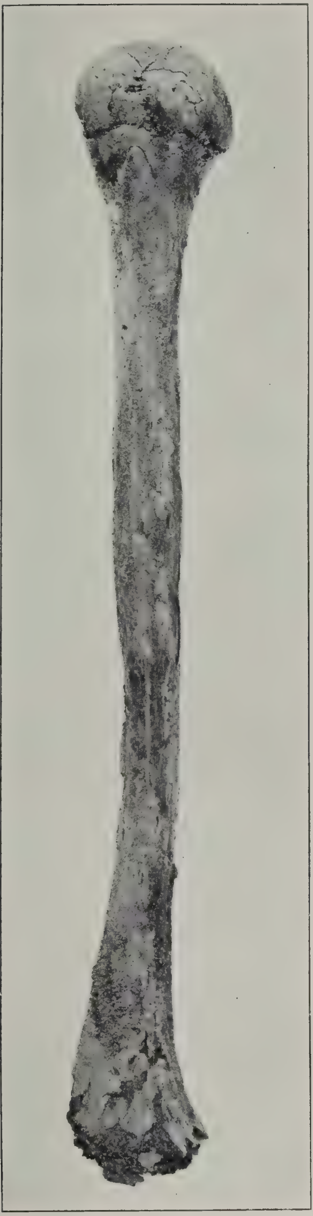

Fig. 101. $^{6}/_{10}$ nat. Humerus dext. ant. aspect.

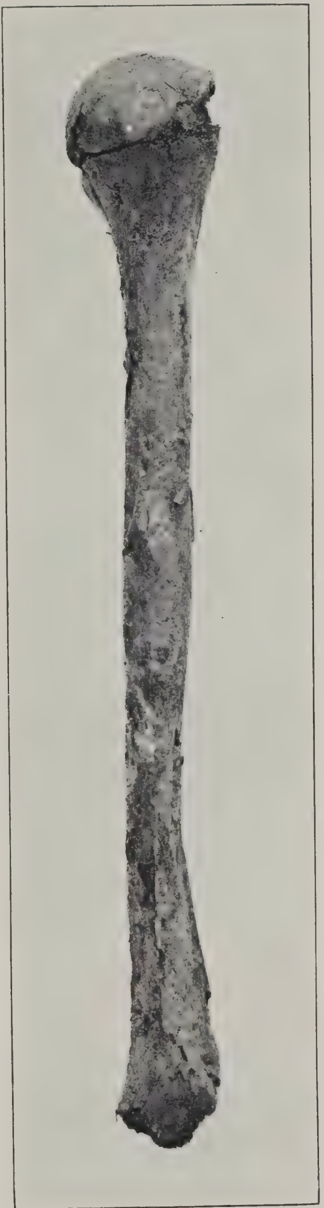

Fig. 102. $^{6}/_{10}$ nat. Humerus sin. ant. aspect.

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Herjolfsnes XV. Fig. 103–104

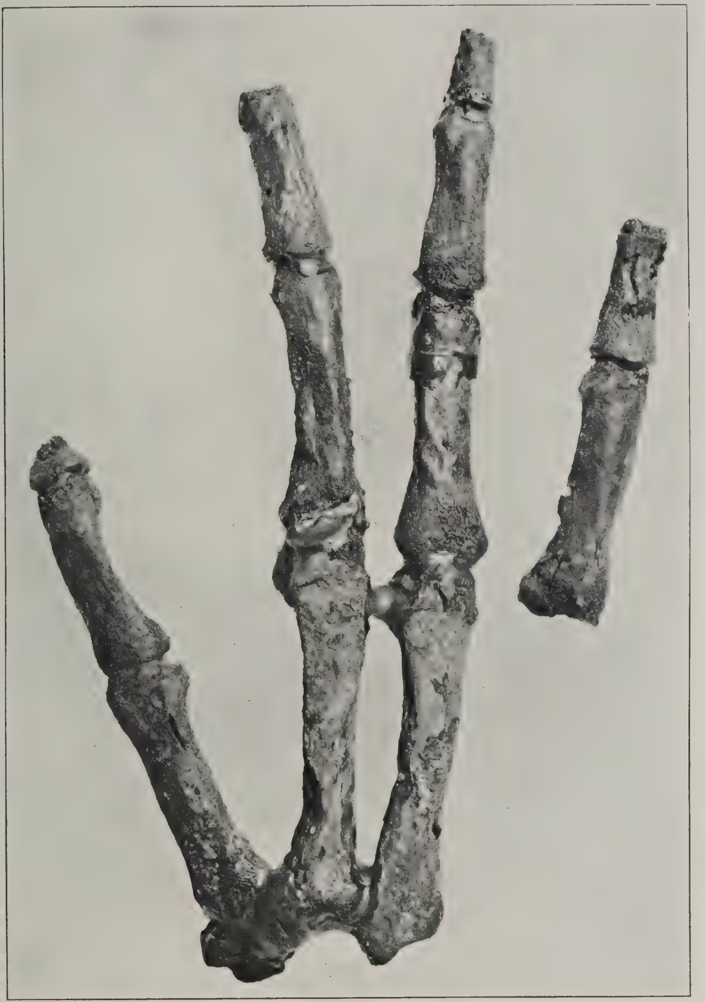

Fig. 103. $^1/_1$ nat. Manus dext. Dorsal aspect.

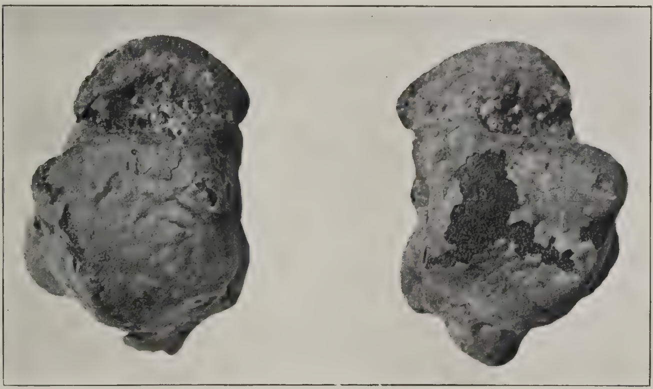

Fig. 104. Talus. sup. aspect. $^1/_1$ nat.

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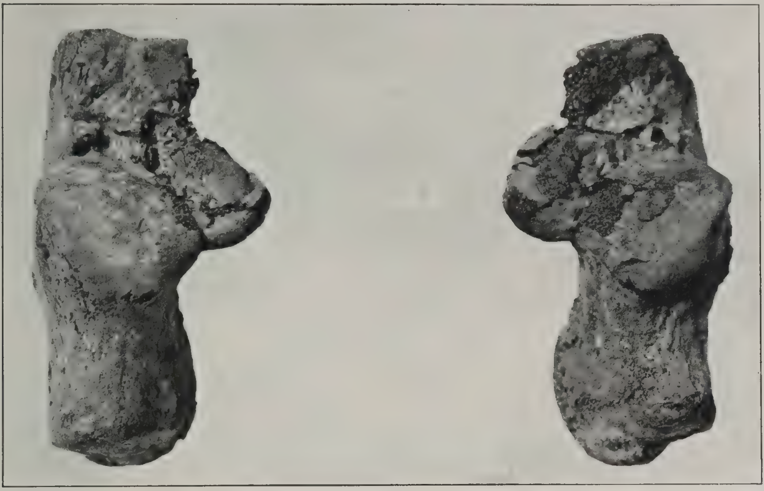
Herjolfsnes XV. Fig. 105–108



sin. Fig. 105. $^1/_1$ nat. Calcaneus sup. aspect. dext.

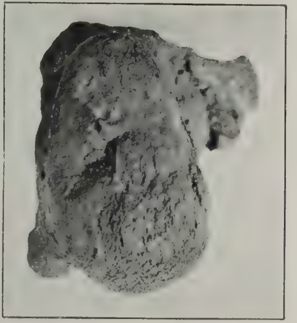


Fig. 106. $^1/_1$ nat. Calcaneus post aspect.

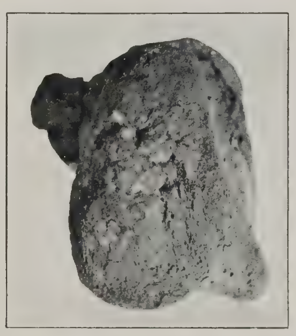
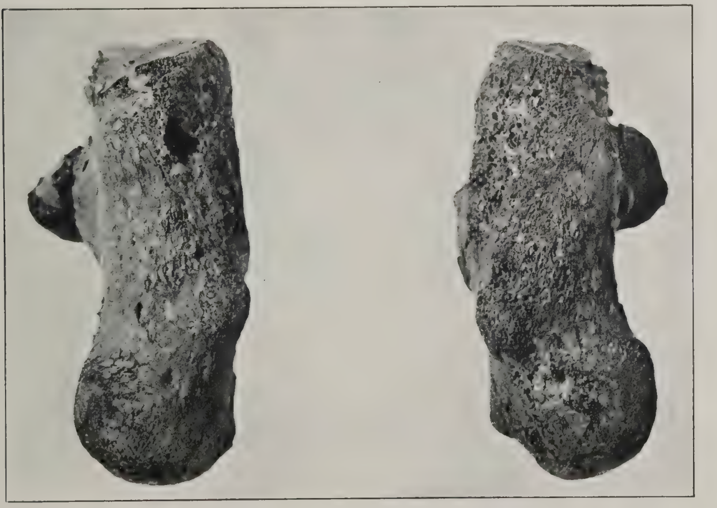


Fig. 107. $^1/_1$ nat. Calcaneus post. aspect.



sin. Fig. 108. $^1/_1$ nat. Calcaneus inf. aspect. dext.

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Herjolfsnes XV. Fig. 109–111

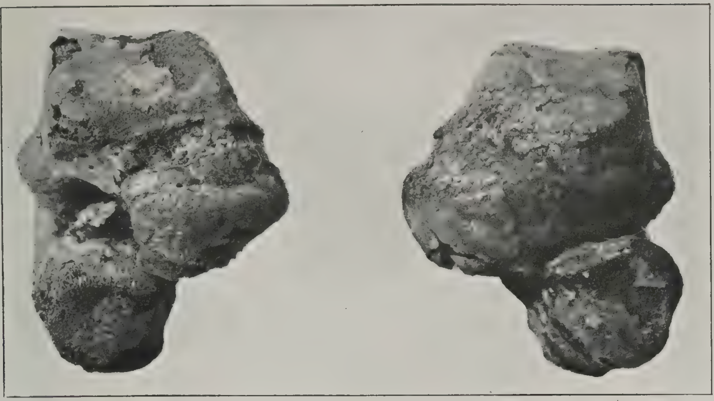

Fig. 109. $^1/_1$ nat. Talus + Calcaneus. ant. aspect.

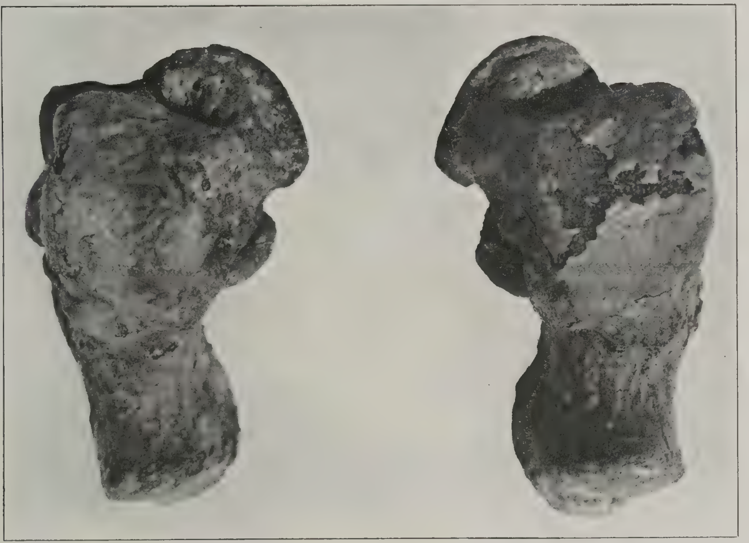

Fig. 110. $^1/_1$ nat. Talus + Calcaneus superior aspect.

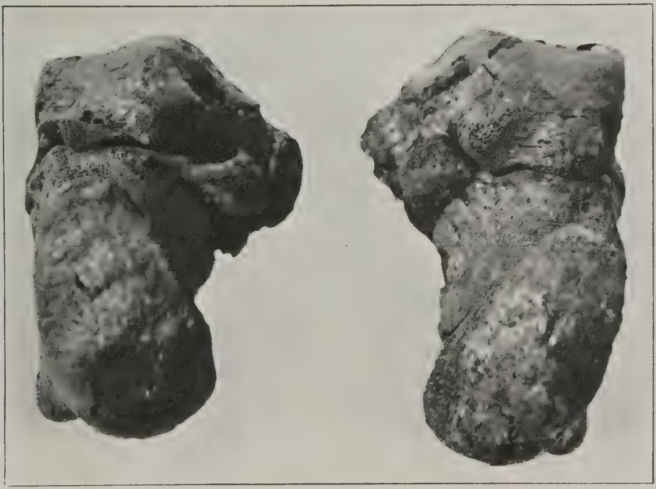

Fig. 111. $^1/_1$ nat. Talus + Calcaneus post. aspect.

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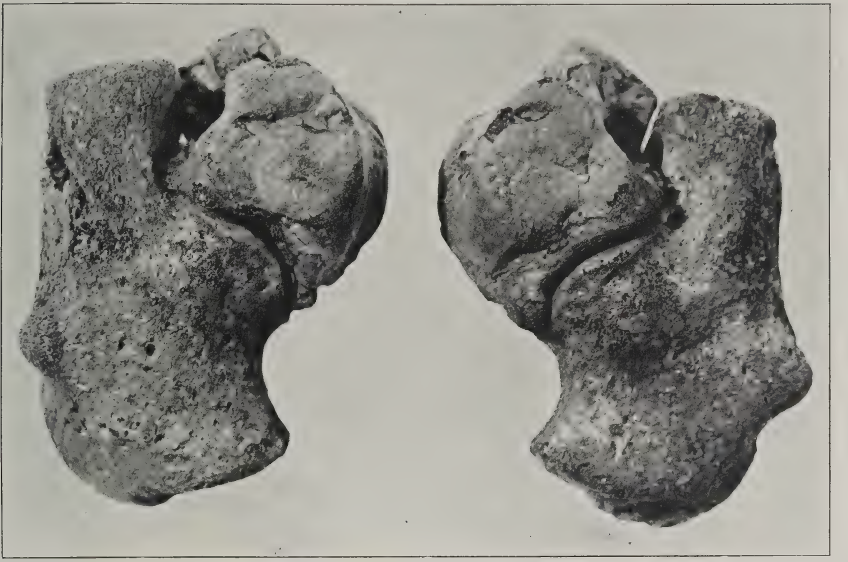
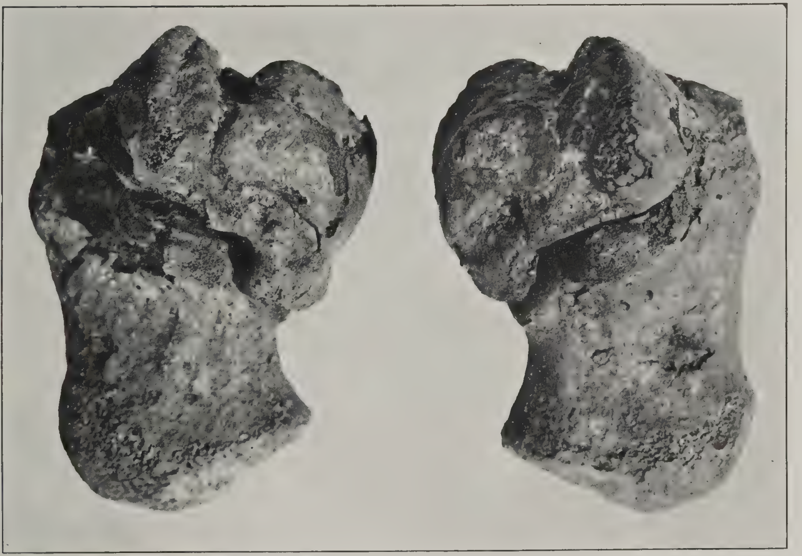
Herjolfsnes XV. Fig. 112–113



sin. dext.

Fig. 112. $^1/_1$ nat. Talus + Calcaneus. lateral aspect.



dext. sin.

Fig. 113. $^1/_1$ nat. Talus + Calcaneus. medial aspect.

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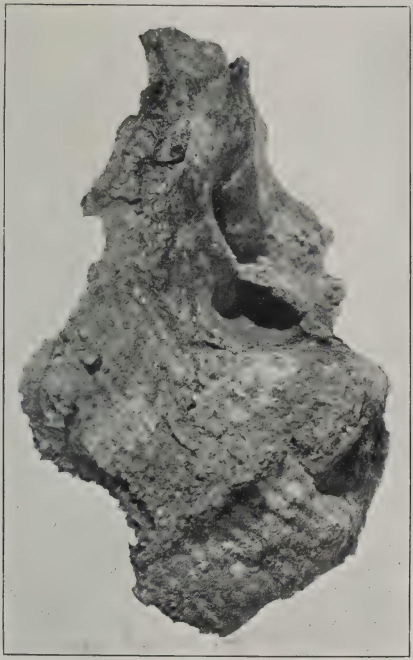
TABULA XXXIX

WITH

FIGURES 114—119.

Herjolfsnes XVII. Fig. 114–119



g. 114.
nat. Os
mporis
. lateral
spect.

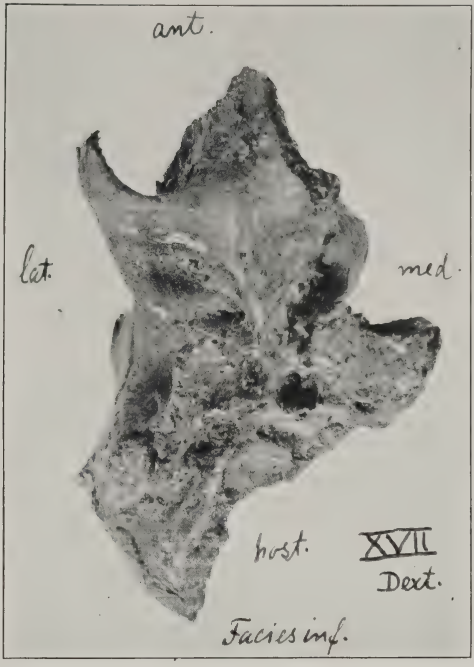
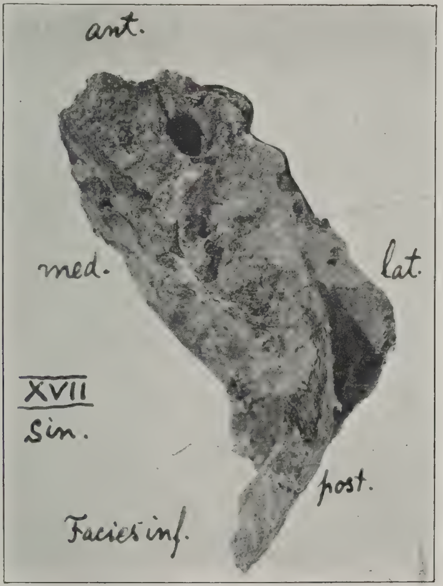


Fig. 115.
$^1/_1$ nat. Os
temporis
dext. Facies
inf. lat.



g. 116.
nat. Os
poris sin.
'acies
. med.

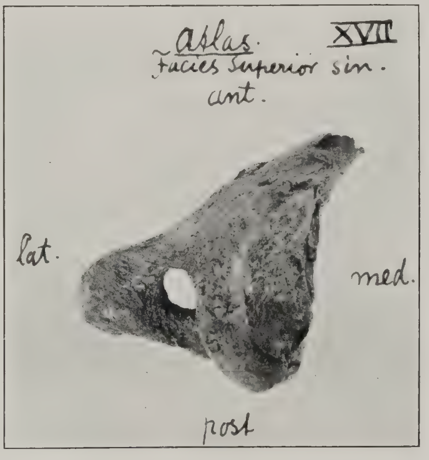
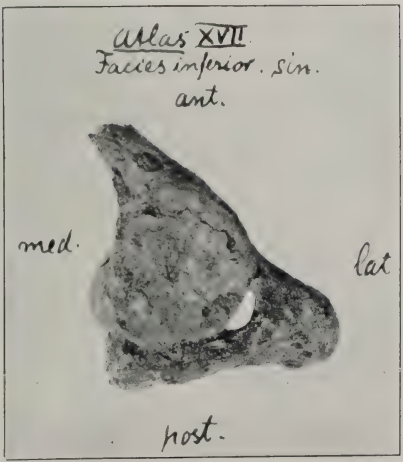


Fig. 117.
ca. $^3/_2$ nat.
Atlas, massa
lat. sin.
Facies sup.



g. 118.
$^3/_2$ nat.
s, massa
t. sin.
ies inf.

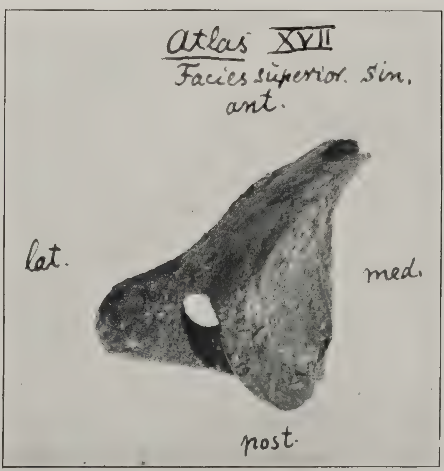


Fig. 119.
ca. $^3/_2$ nat.
Atlas, massa
lat. sin.
Facies sup.

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TABULA XL—LI

WITH

FIGURES 120 159.

Herjolfsnes XX. Fig. 120–123

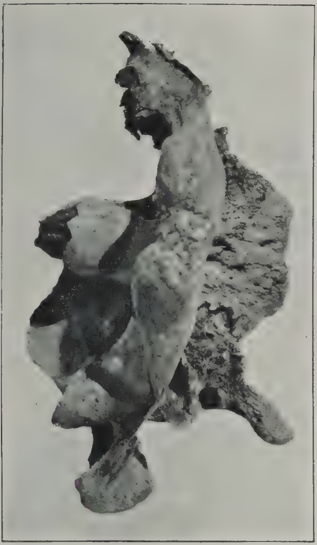

Fig. 121. $^{1}/_{1}$ nat. Atlas + Epistropheus post. aspect.

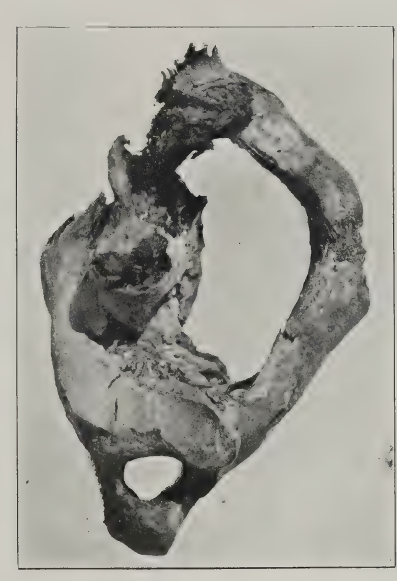

Fig. 123. $^{1}/_{1}$ nat. Atlas + Epistropheus. sup. aspect.

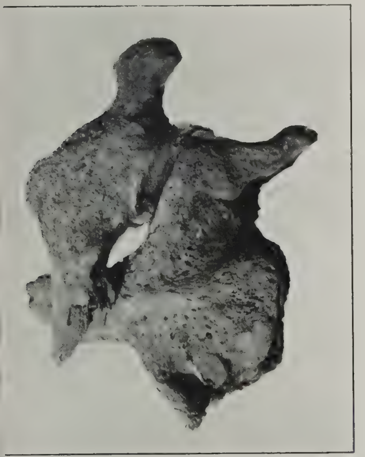

Fig. 120. $^{1}/_{1}$ nat. Atlas + Epistropheus. ant. aspect

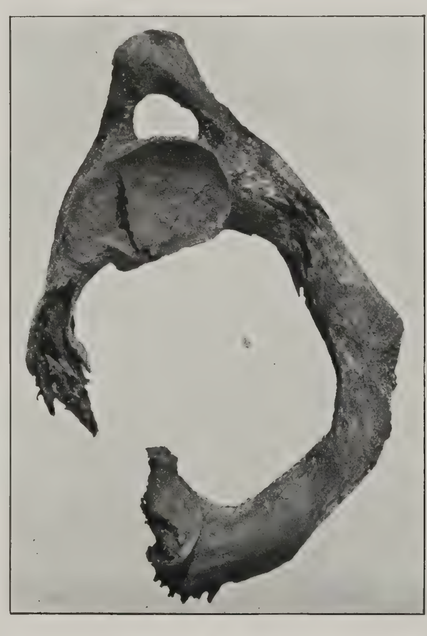

Fig. 122. ca. $^{9}/_{8}$ nat. Atlas inf. aspect.

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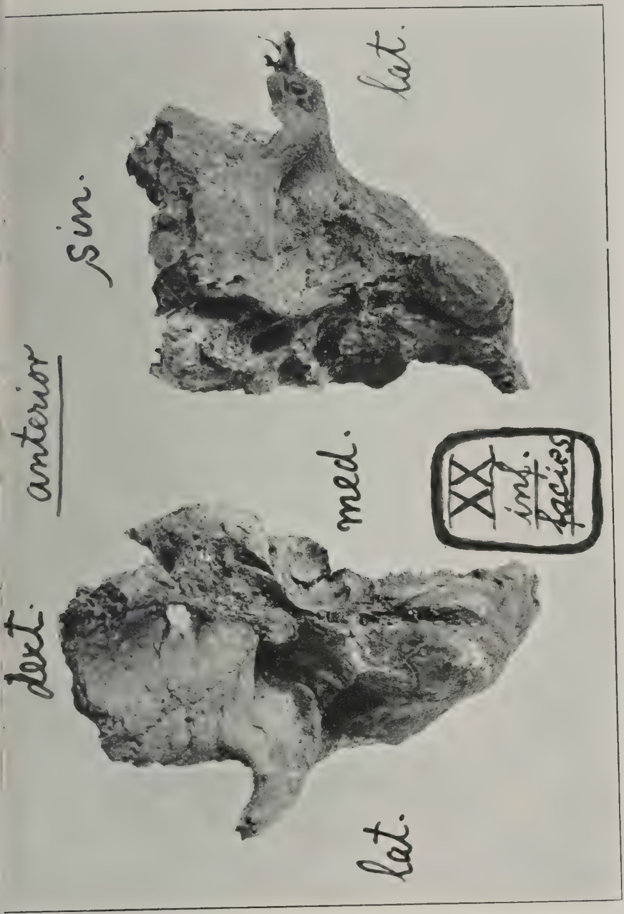
Herjolfsnes XX. Fig. 124–127



dext. sin.

Fig. 124. 1/1 nat. Ossa temporis. inferior aspect.

ant.

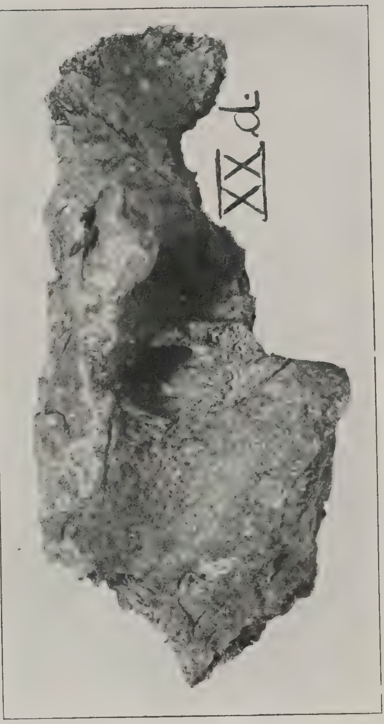
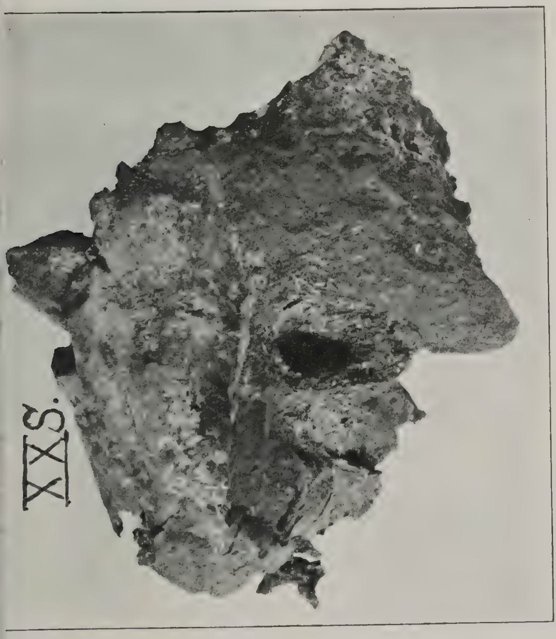


Fig. 126. 1/1 nat. Os temporis dext. lateral aspect.



ant.

Fig. 125. 1/1 nat. Os temporis sin. lateral aspect.

Incus Stapes Malleus

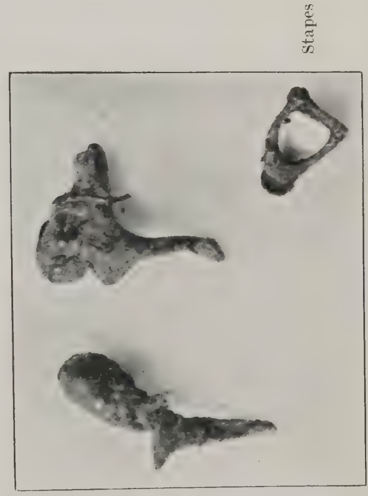


Fig. 127. 3,5 × nat. size. XX. Malleus dext. Incus dext. Stapes dext.

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Herjolfsnes XX. Fig. 128–131

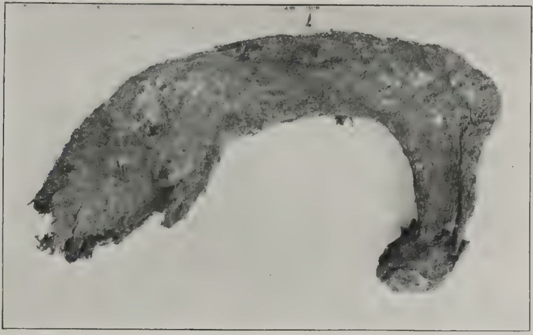

Fig. 128. $^1/_1$ nat. Costa I. dext. Facies. sup.

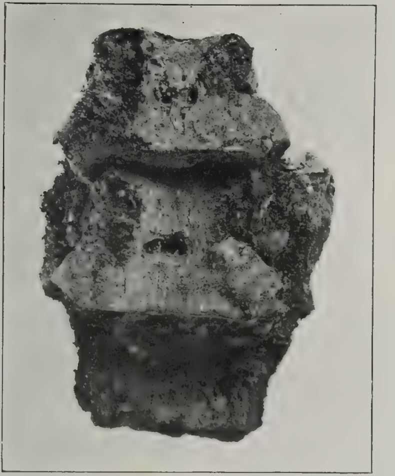

Fig. 130. $^{0,97}/_1$ nat. Manubrium sterni. Facies post. with 2 vertebræ.

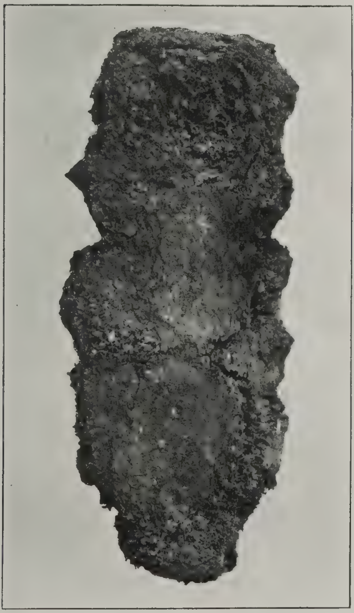

Fig. 131. $^{0,97}/_1$ nat. Corpus sterni. Facies post.

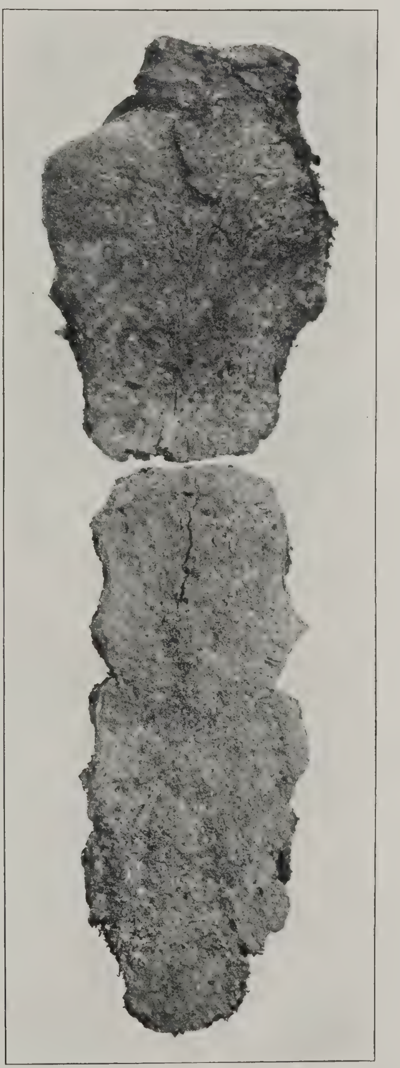

Fig. 129. ca. $^1/_1$ nat. Sternum. Facies ant.

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Herjolfsnes XX. Fig. 132--134

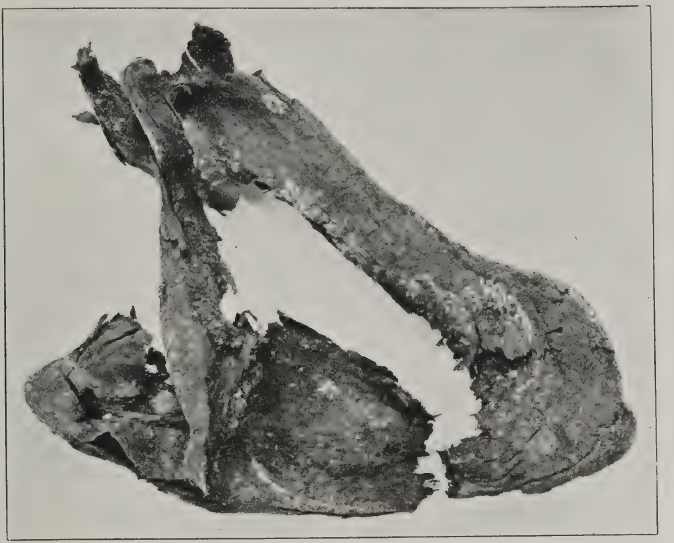

Fig. 134. $^{4}/_{5}$ nat. Scapula dext. Facies post.

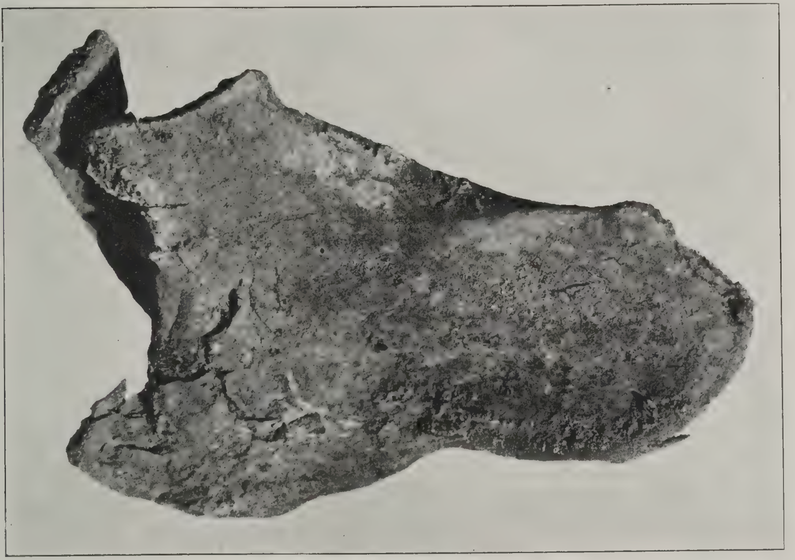

Fig. 133. $^{4}/_{5}$ nat. Scapula sin. Facies ant.

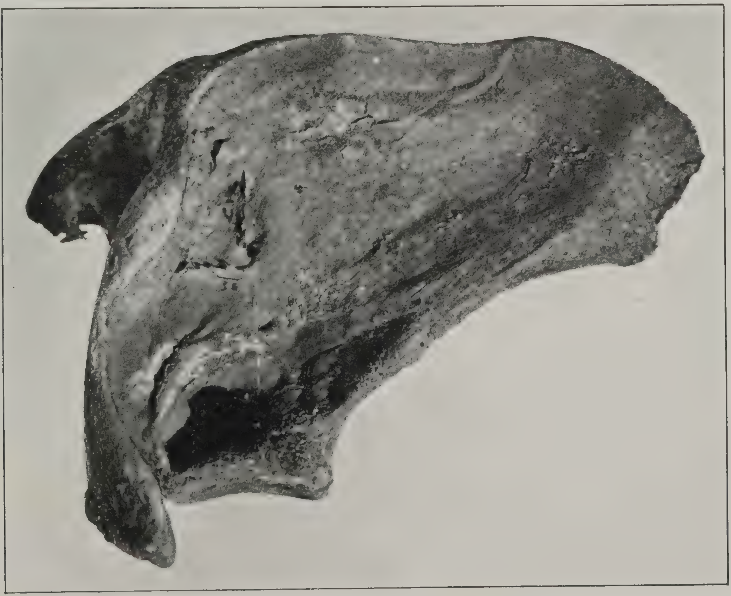

Fig. 132. $^{4}/_{5}$ nat. Scapula sin. Facies post.

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Herjolfsnes XX. Fig. 135–38

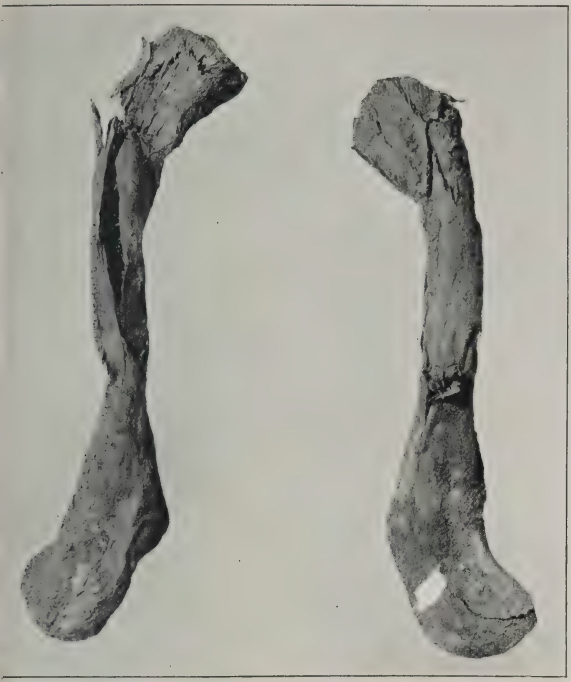

Fig. 135. $^{2}/_{3}$ nat. Claviculæ. Facies sup.

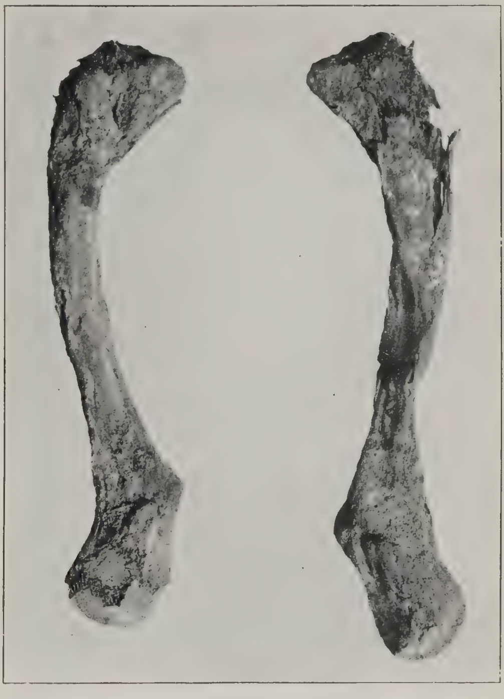

Fig. 136 abt. $^{2}/_{3}$ nat. Claviculæ. Facies inf.

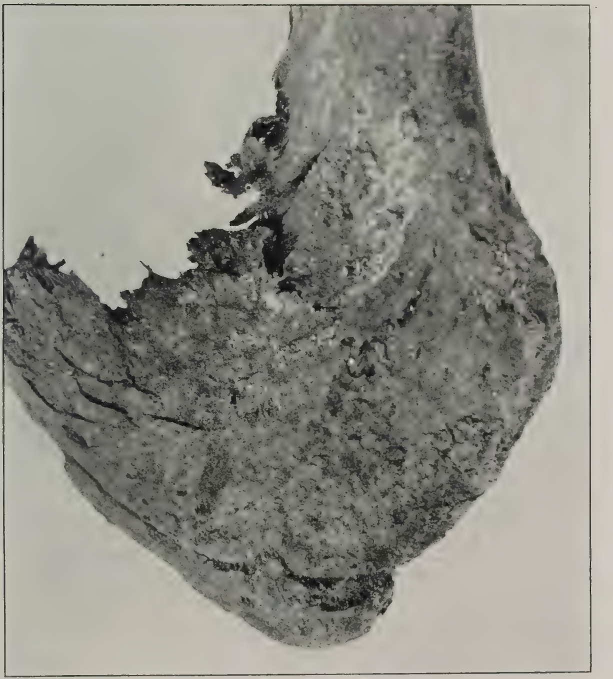

Fig. 137. c. $^{7}/_{4}$ nat. Scapula dext. angulus inf. with epiphysis. Facies post.

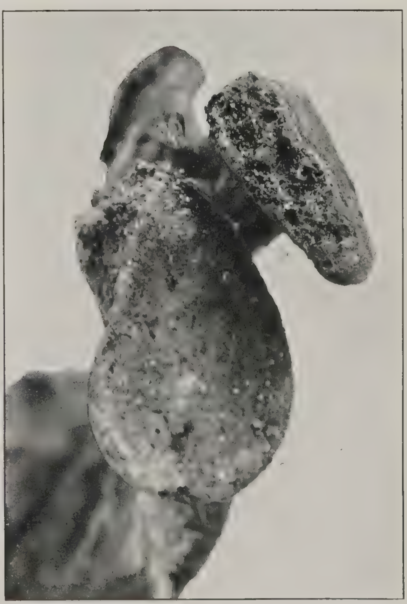

Fig. 138. c. $^{4}/_{3}$ nat. Scapula sin. Cavitas glen. Acrom. ÷ epiphysis.

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Herjolfsnes XX. Fig. 139–140

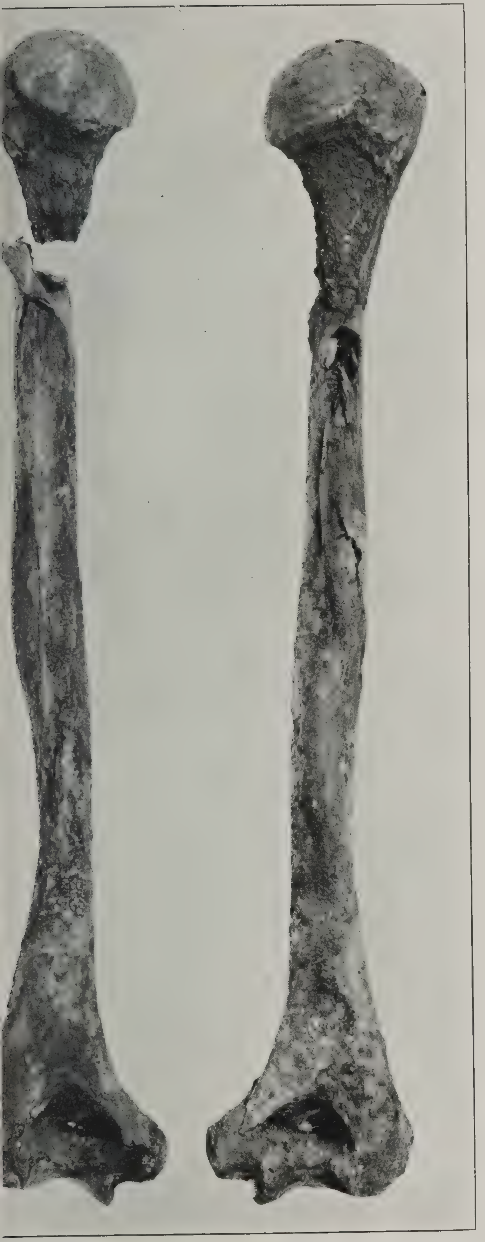
sin. dext.

Fig. 139. c. $^1/_2$ nat. Humeri sin. dext. Facies. post.

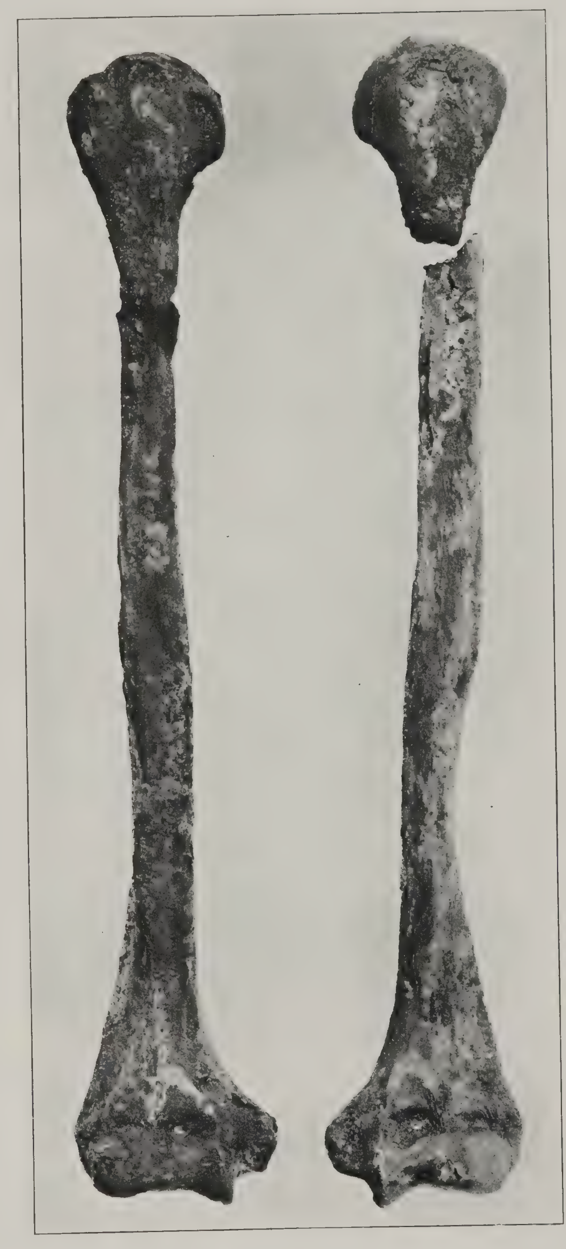
dext. sin.

Fig. 140. c. $^1/_2$ nat. Humeri dext. sin. Facies ant.

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Herjolfsnes XX. Fig. 141–142

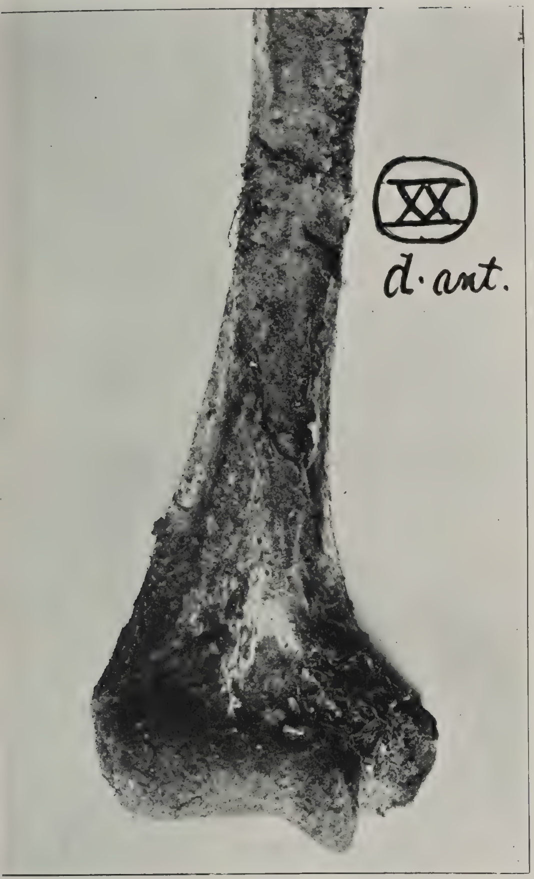

Fig. 141. ca. 5/6 nat. Humerus. dext.
Facies ant.

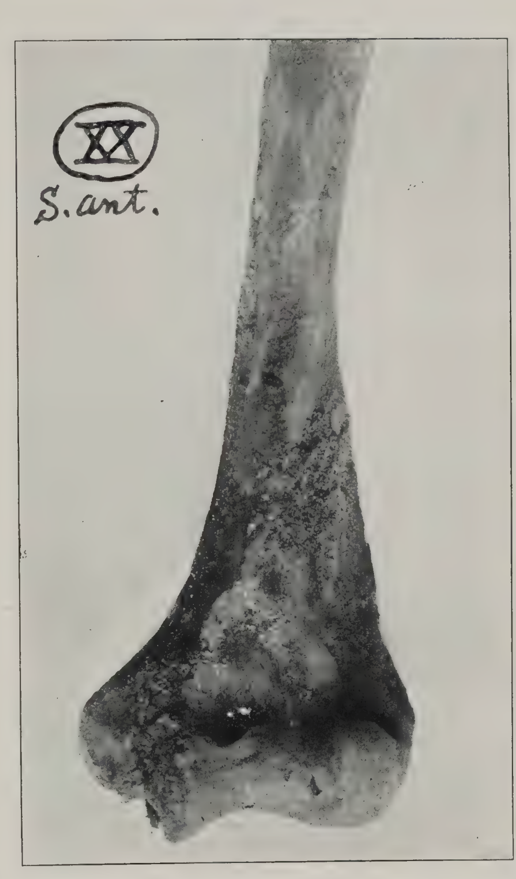

Fig. 142. ca. 5/6 nat. Humerus. sin.
Facies ant.

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Herjolfsnes XX. Fig. 143–144

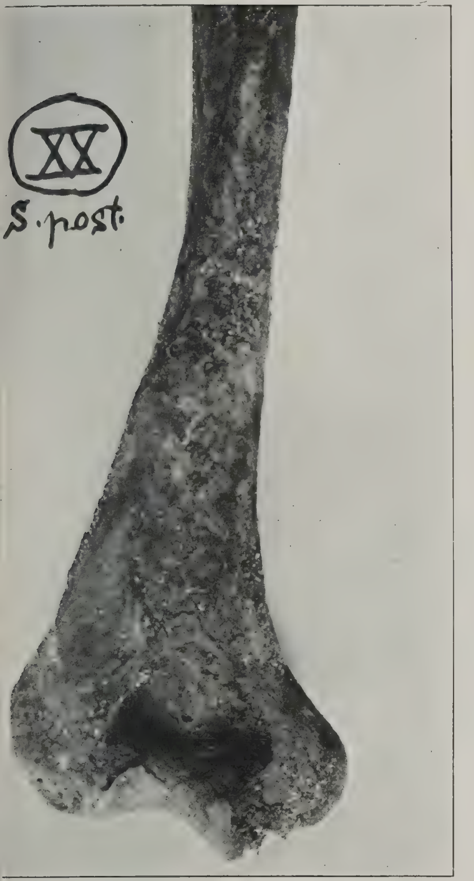

Fig. 143. ca. 5/6 nat. Humerus sin.
Facies post.

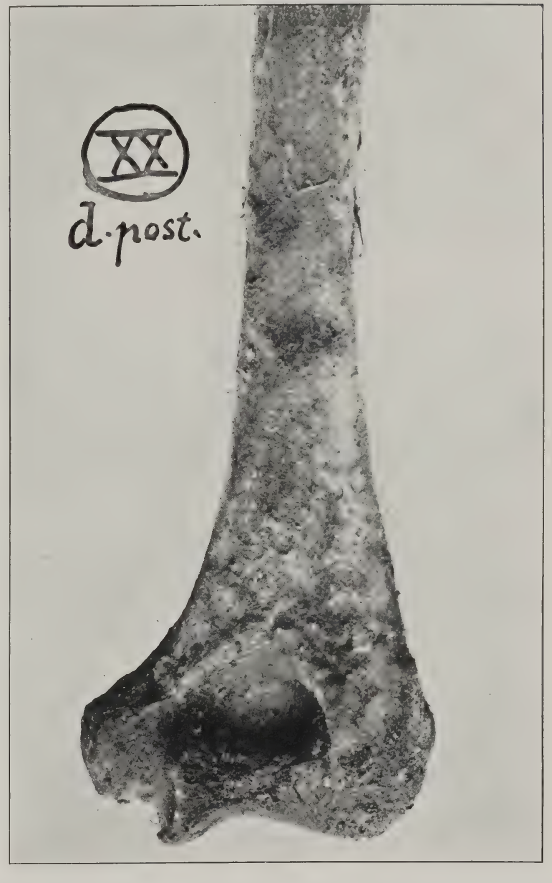

Fig. 144. ca. 5/6 nat. Humerus dext.
Facies post.

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Herjolfsnes XX. Fig. 145--148

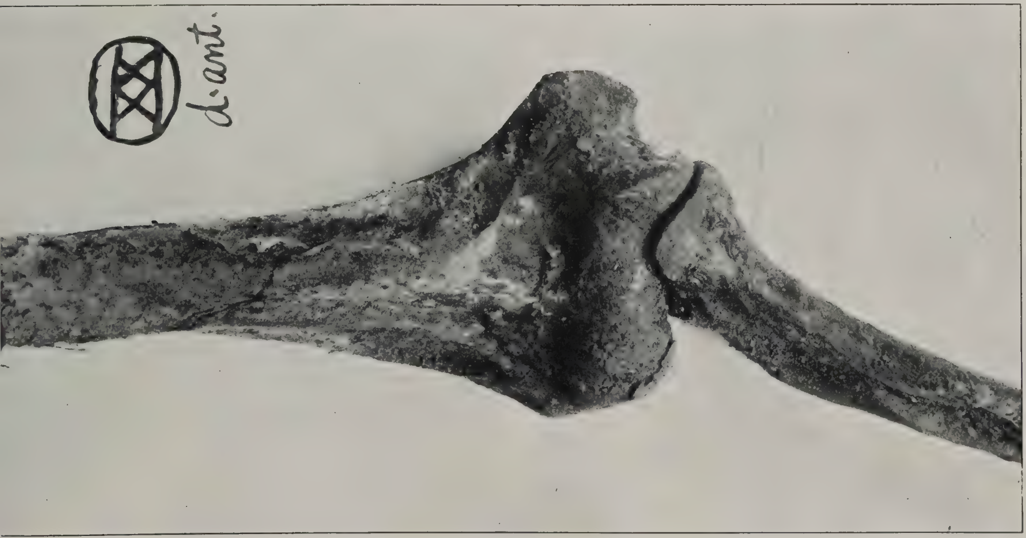

Fig. 145. ca. $^5/_6$ nat. Articulatio humero-ulnaris dext. Ant. aspect.

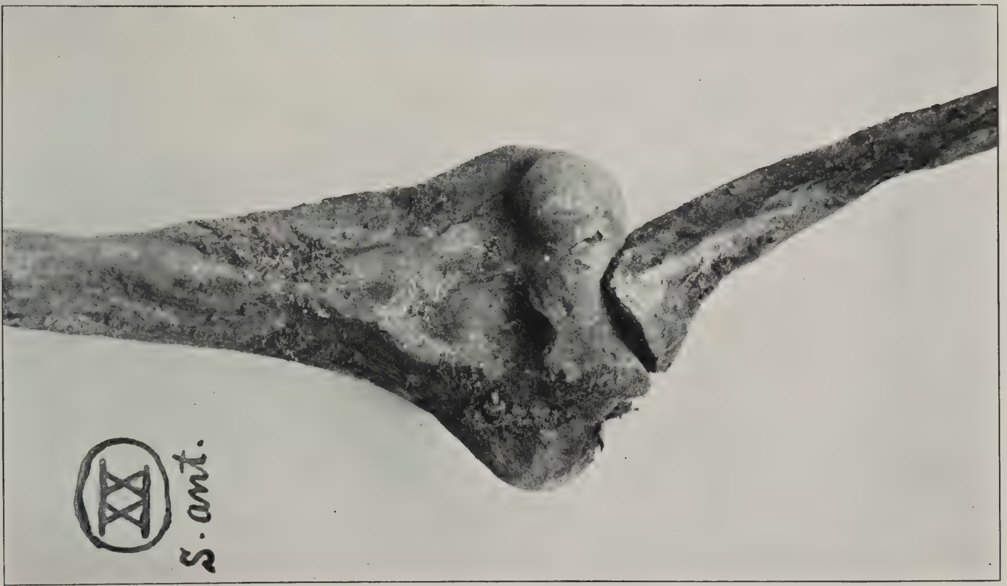

Fig. 146. ca. $^5/_6$ nat. Articulatio humero-ulnaris sin. Ant. aspect.

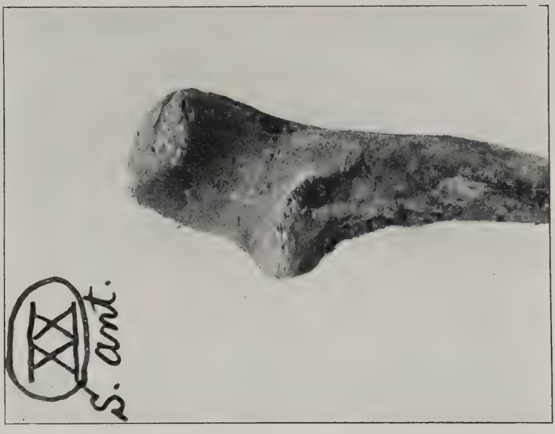

Fig. 147. ca. $^5/_6$ nat. Ulna sin. Extremitas sup. Ant. aspect.

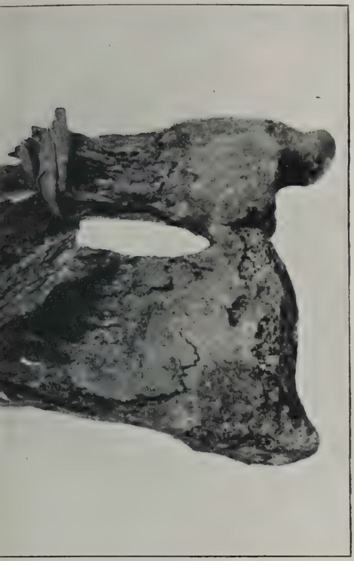

Fig. 148. $^1/_1$ nat. Radius dext. + Ulna dext. Extremitas inferior. ant. aspect.

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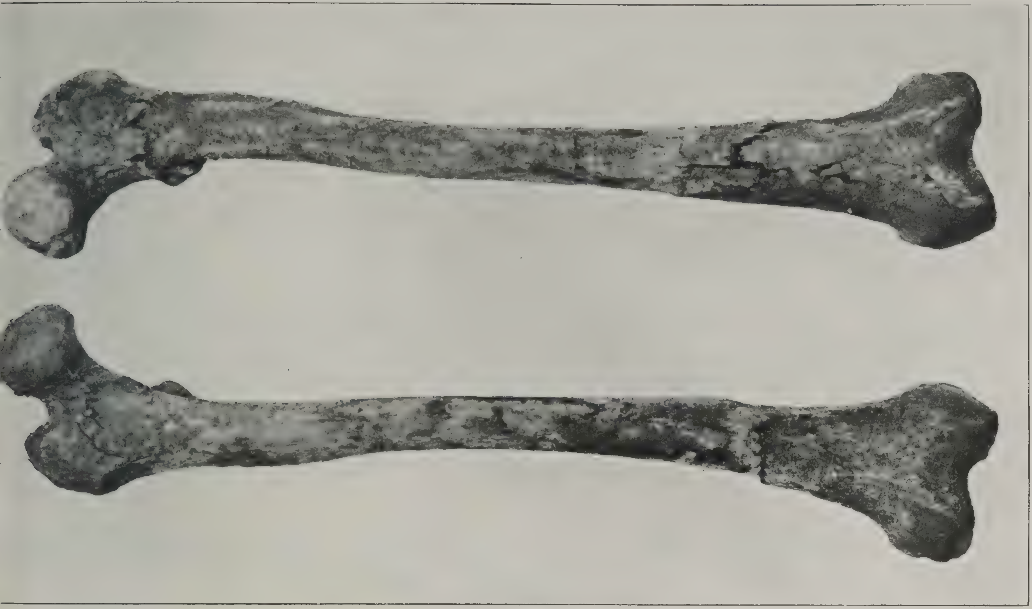
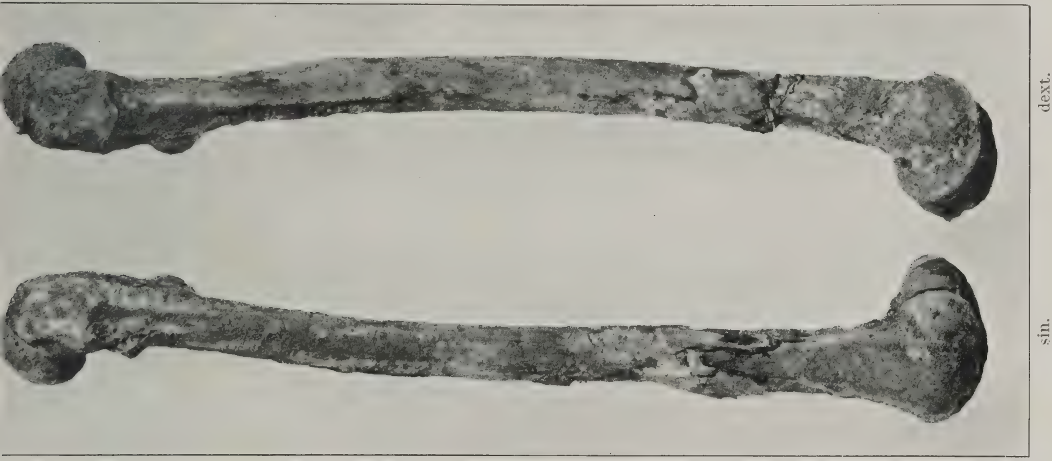
Herjolfsnes XX. Fig. 149–151



dext.   sin.

Fig. 149. $^1/_3$ nat. Femora ant. aspect.



sin.   dext.

Fig. 150. $^1/_3$ nat. Femora lateral aspect.

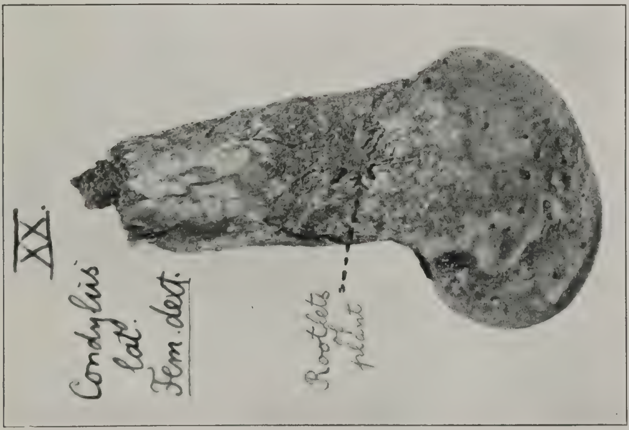


Fig. 151. $^2/_3$ nat. Condylus lat. Fem. dext.

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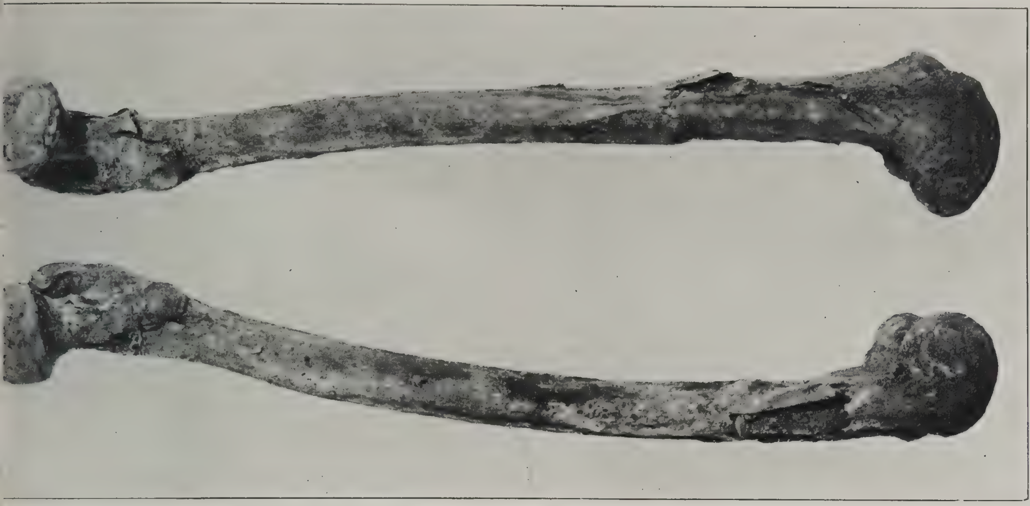
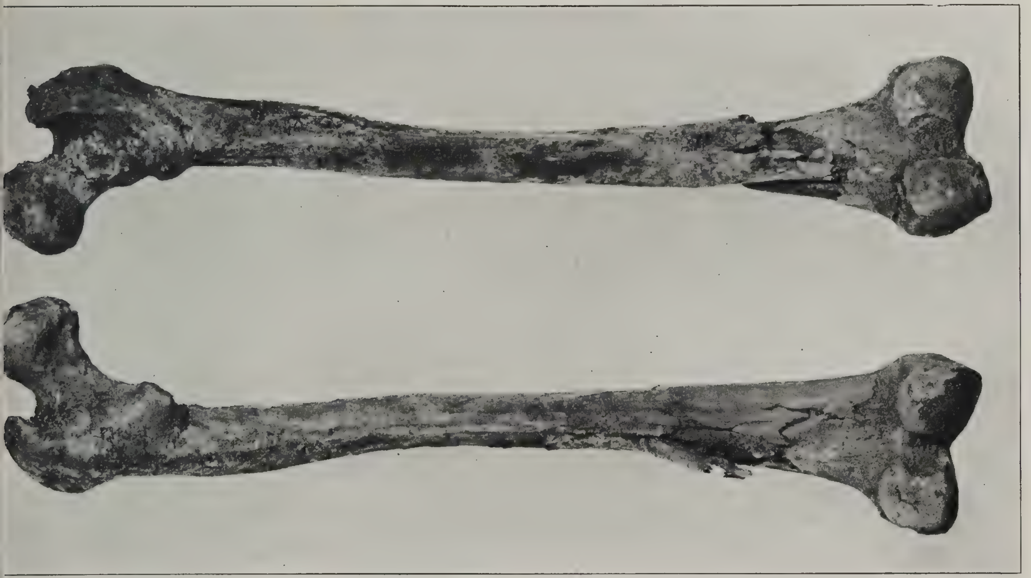
Herjolfsnes XX. Fig. 152–154



dext. sin.

Fig. 152. 1/3 nat. Femora medial aspect.



sin. dext.

Fig. 153. 1/3 nat. Femora post. aspect.

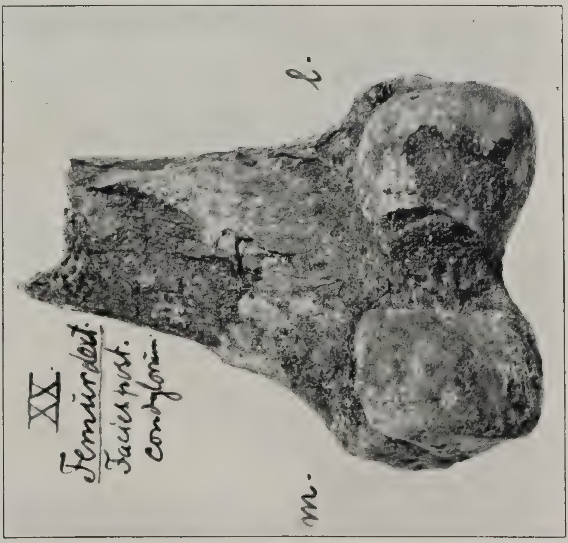


Fig. 154. ca. 4/5 nat. Femur dext. Facies post.

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Herjolfsnes XX. Fig. 155–157

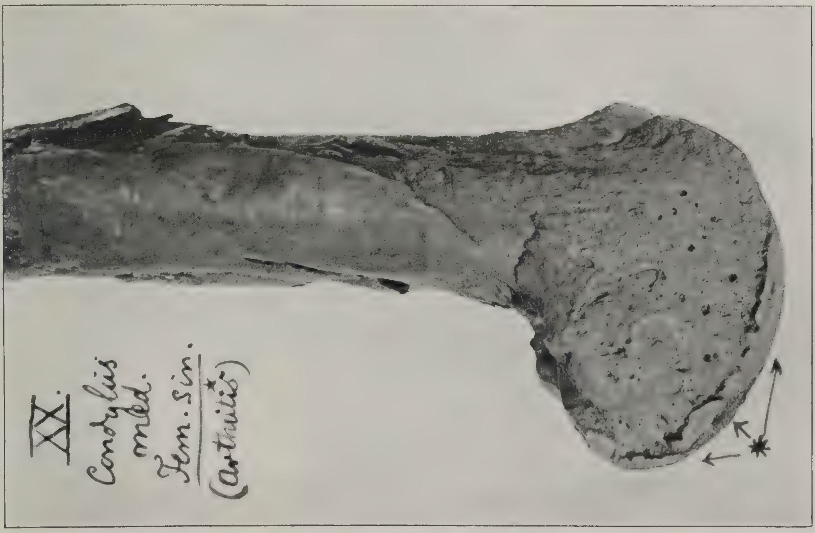

Fig. 155. 4/5 nat. Condylus med. Fem. sin. (Arthritis).

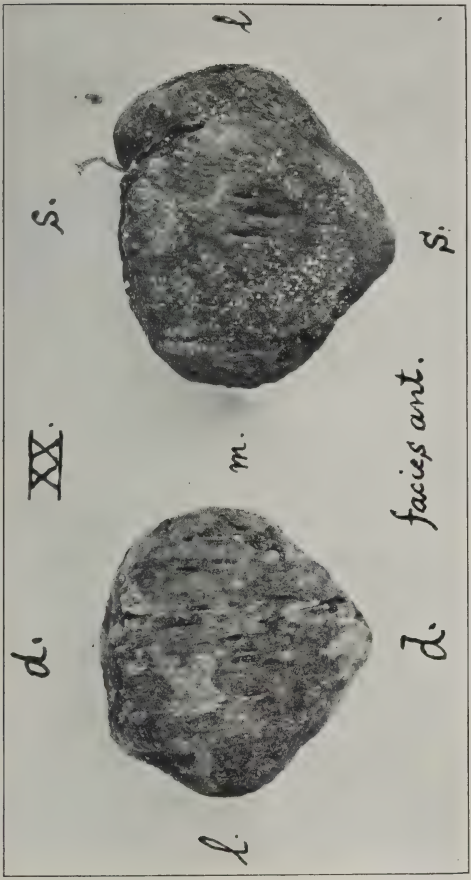

Fig. 156. 1/1 nat. Patellæ facies ant.

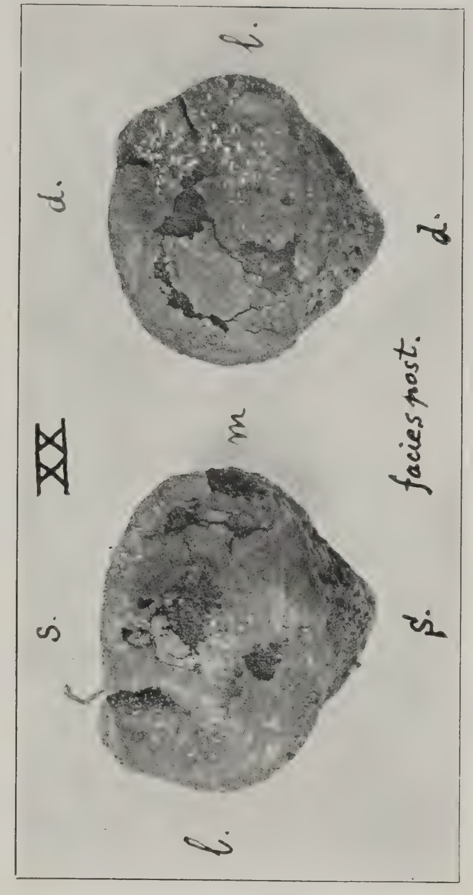

Fig. 157. 1/1 nat. Patellæ facies post.

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Herjolfsnes XX. Fig. 158–159

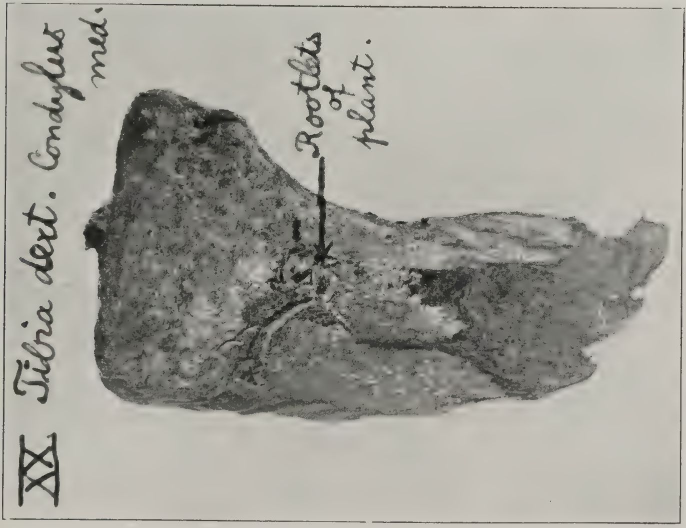

Fig. 158. ca. $^2/_3$ nat. Tibia dext. Condylus med.

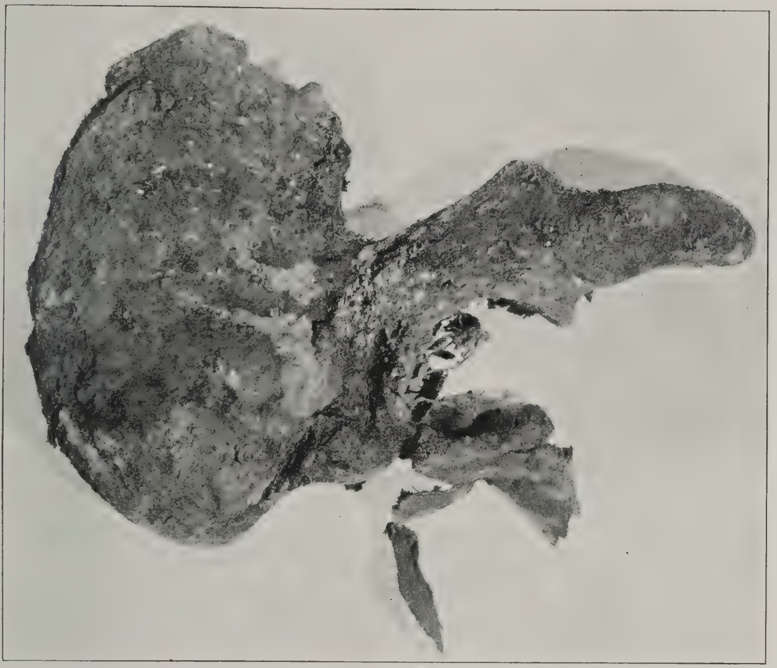

Fig. 159. $^1/_2$ nat. Os coxæ sin. lateral aspect.

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CRANIA

TABULA LII—LXVII

WITH

FIGURES 160—198

TABULA LII: *HERJOLFSNES XIX*, fig. 160.

TABULA LII—LIV: *IKIGAIT 344*, fig. 161—165.

TABULA LV—LVII: *IKIGAIT 343*, fig. 166—170 and *HERJOLFSNES II*, fig. 171.

TABULA LVIII: *IKIGAIT 343*, fig. 172—174 and *HERJOLFSNES II*, fig. 175—177.

TABULA LIX—LX: *HERJOLFSNES II*, fig. 178—181.

TABULA LXI—LXIII: *HERJOLFSNES XVII*, fig. 182—188.

TABULA LXIV—LXVI: *HERJOLFSNES XVIII*, fig. 189—195.

TABULA LXVII: *HERJOLFSNES X*, fig. 196—197 and *HERJOLFSNES XX*, fig. 198.

Herjolfsnes XIX. Fig. 160

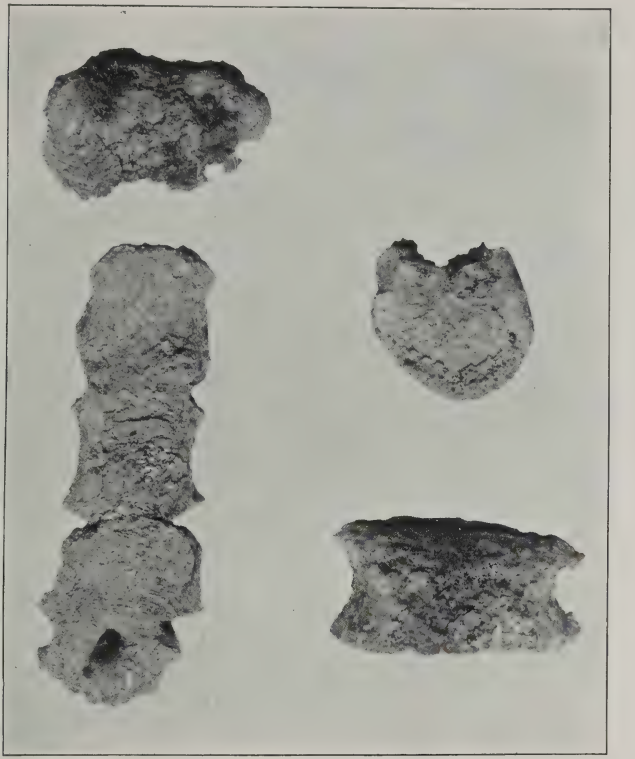

Fig. 160.
ca. $^{6}/_{10}$ nat.
Sternum.
V. dorsalis.
Facies sup.
V. lumbalis.
Facies ant.

CRANIA

Ikigait 344. Fig. 161

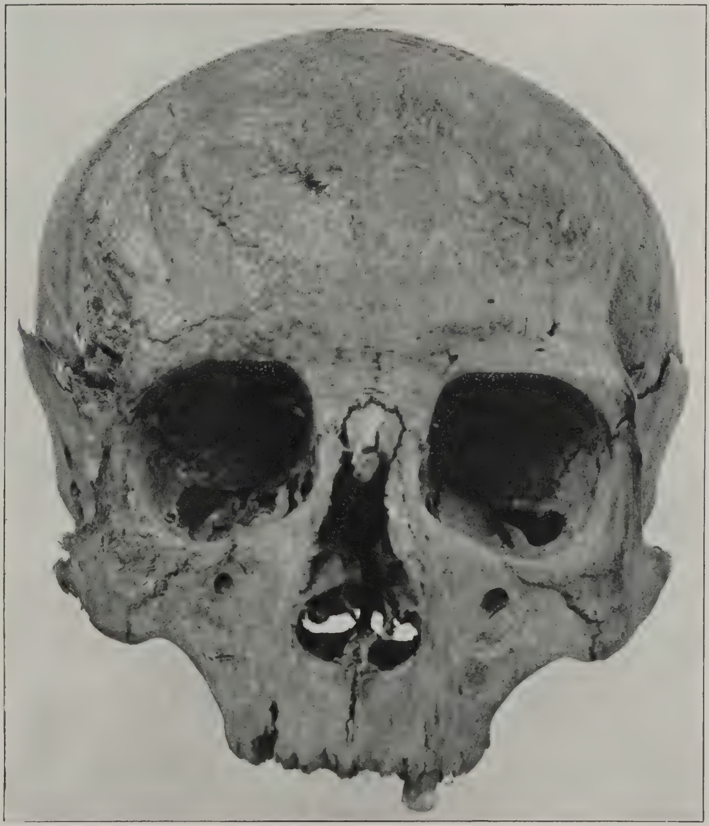

Fig. 161.
$^{3}/_{5}$ nat.
orma facialis.

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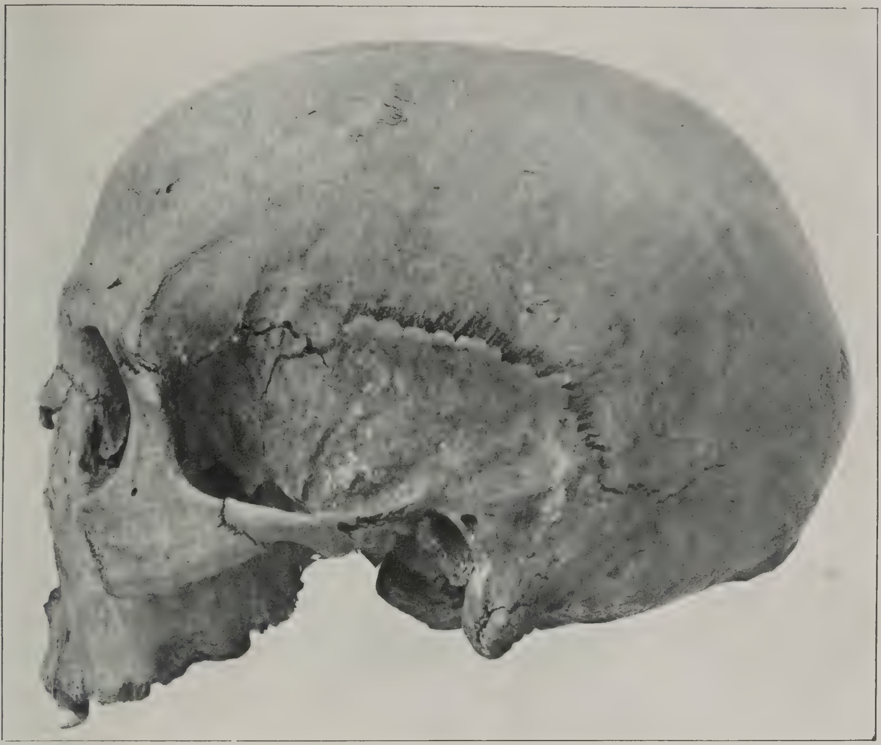
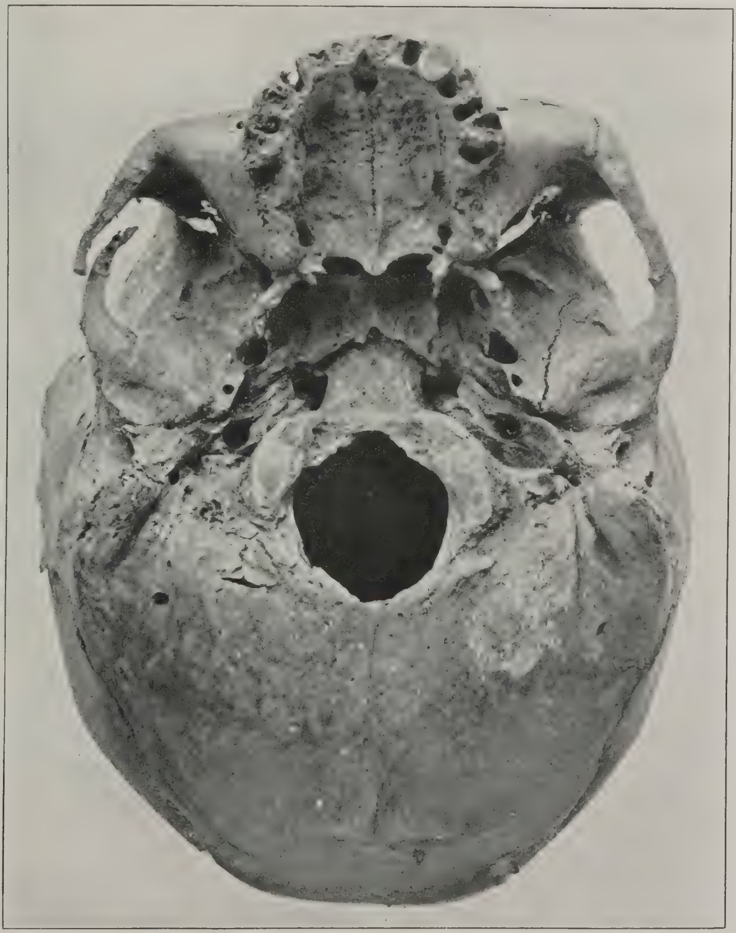
Ikigait 344. Fig. 162–163



ig. 162.
$/_5$ nat.
Norma
mporalis
sin



ig. 163. $^3/_5$ nat.
Norma basalis.

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Ikigait 344. Fig. 164–165

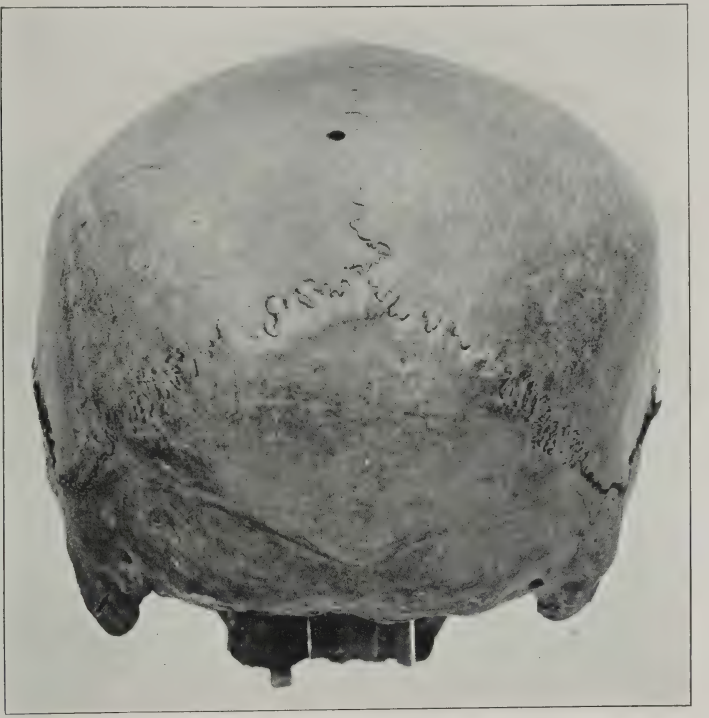

Fig. 164. 3/5 nat. Norma occipitalis.

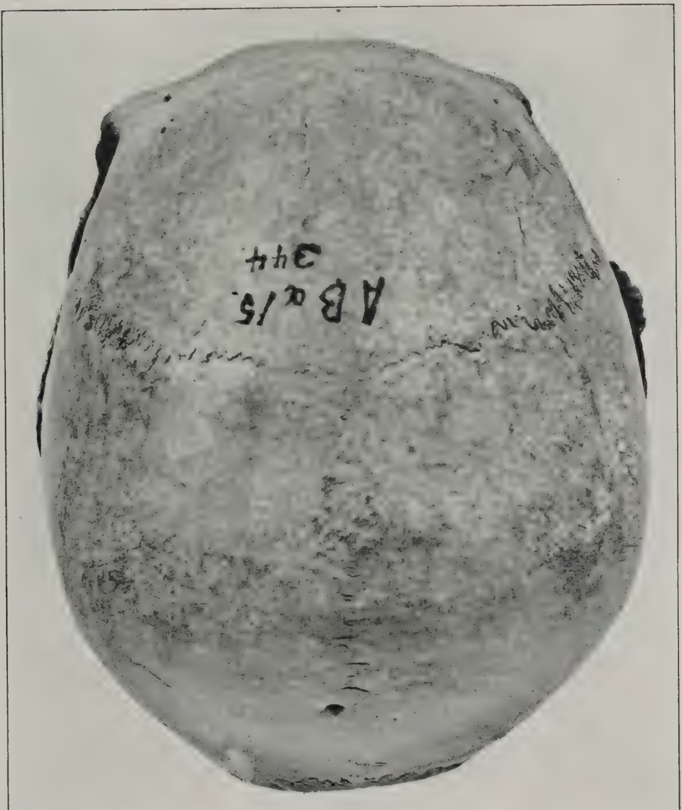

Fig. 165. 3/5 nat. Norma parietalis.

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Ikigait 343. Fig. 166–167

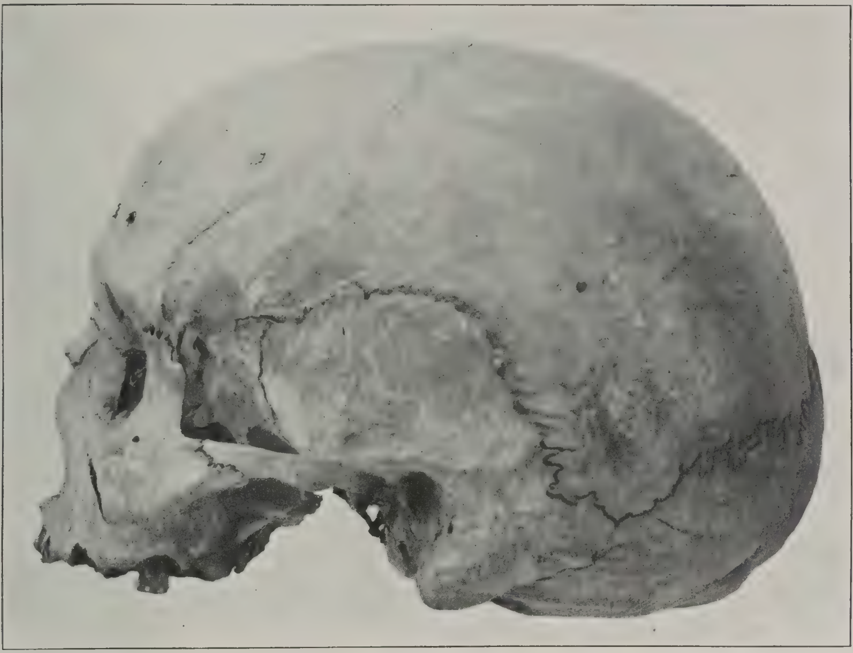

Fig. 166. $^3/_5$ nat. Norma temporalis sin.

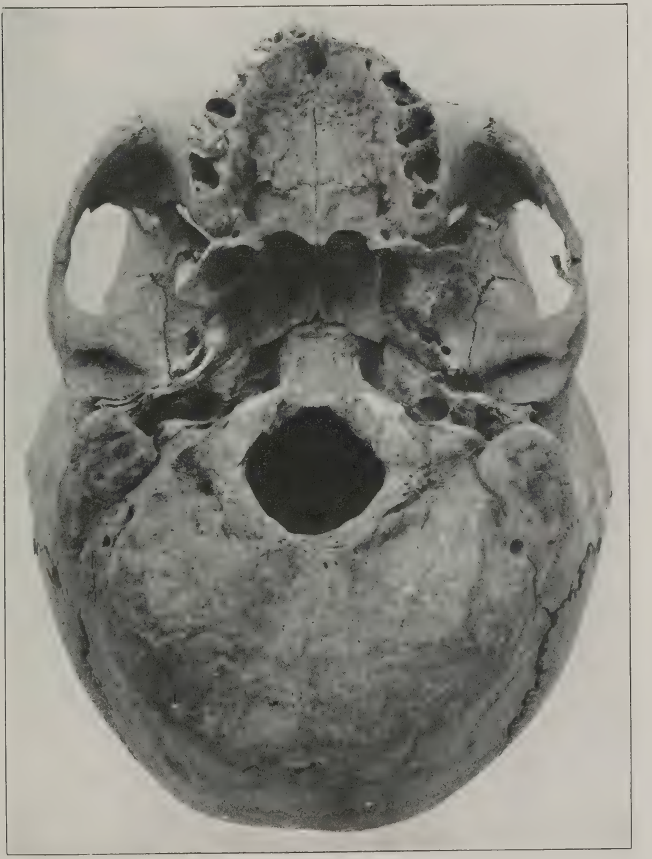

Fig. 167. $^3/_5$ nat. Norma basalis.

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Ikigait 343. Fig. 168–169

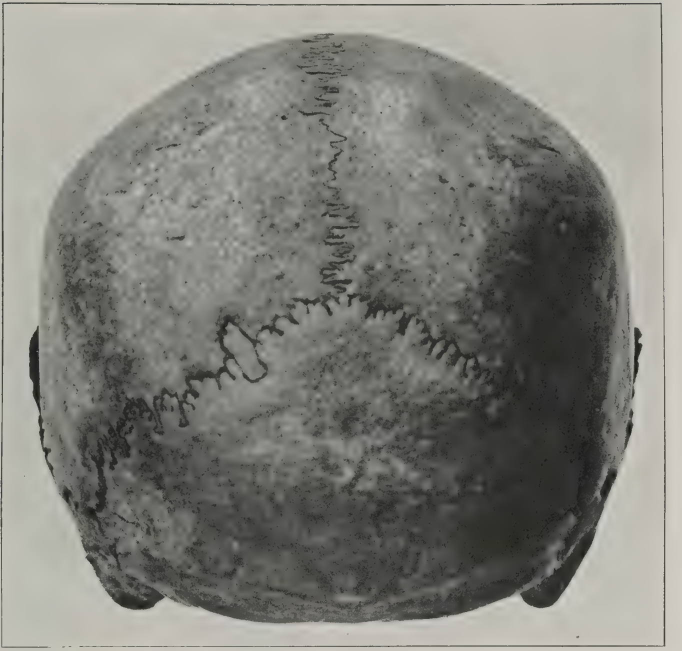

Fig. 168. $^3/_5$ nat. Norma occipitalis.

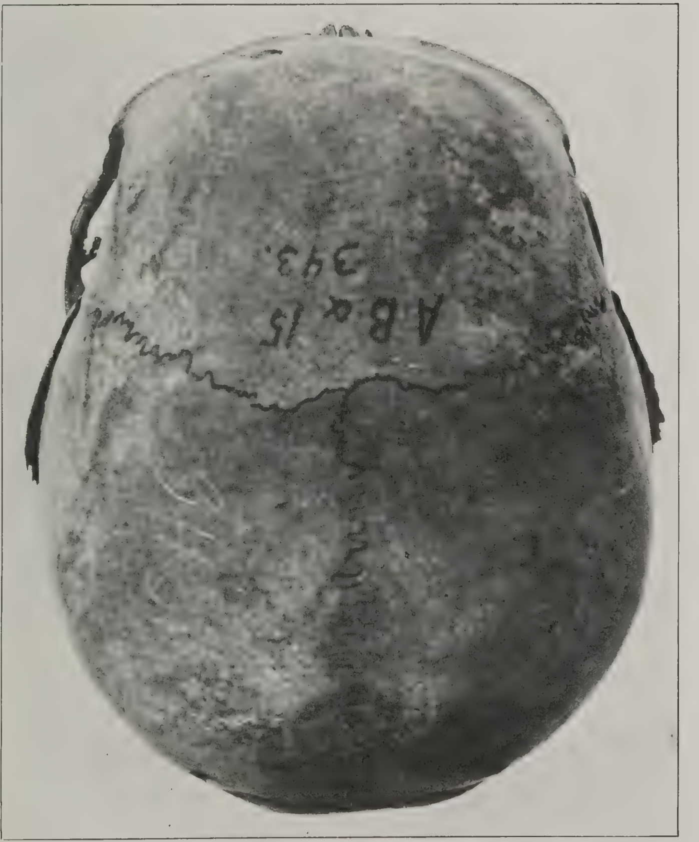

Fig. 169. $^3/_5$ nat. Norma parietalis.

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Ikigait 343. Fig. 170 Herjolfsnes II. Fig. 171

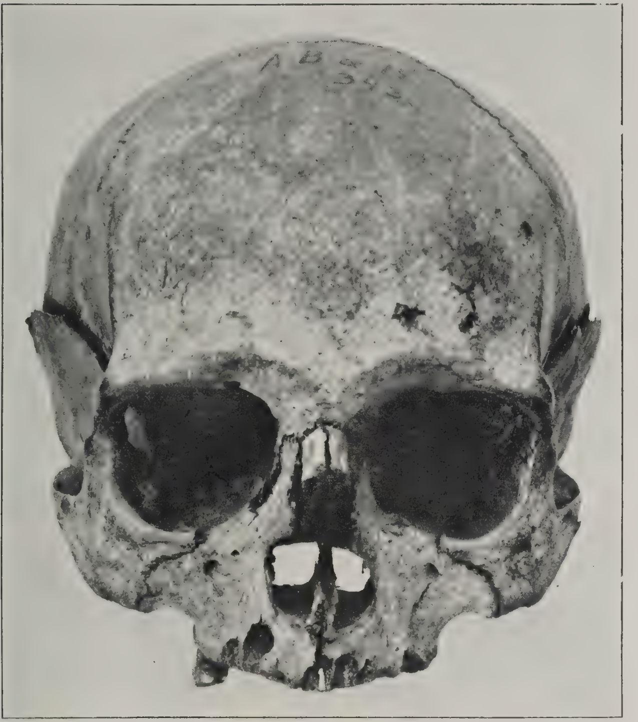

Fig. 170. $^3/_5$ nat. Ikigait 343. Norma facialis.

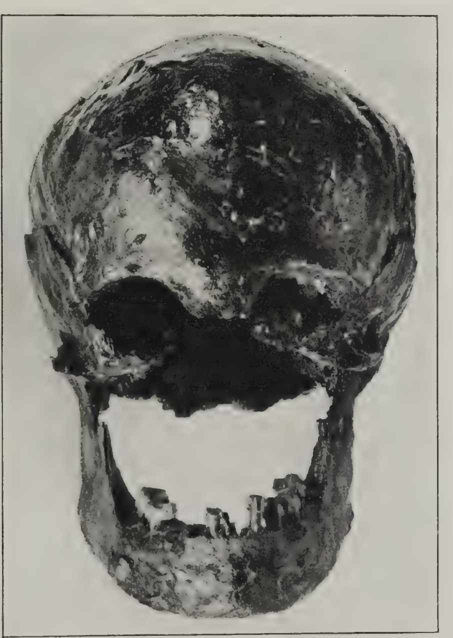

Fig. 171. $^3/_5$ nat. Herjolfsnes II. Norma facialis.

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Ikigait 343. Fig. 172–174

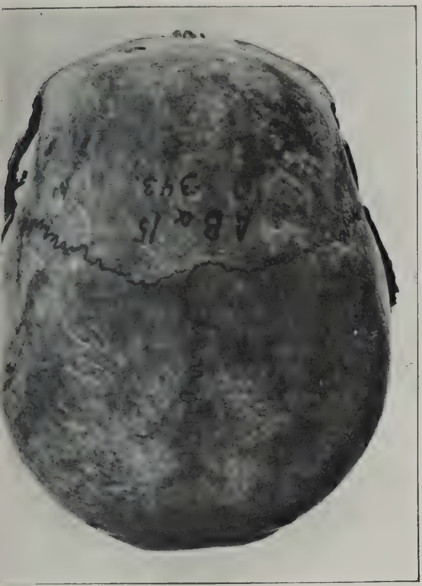

Fig. 172. $^{2}/_{5}$ nat. Norma parietalis.

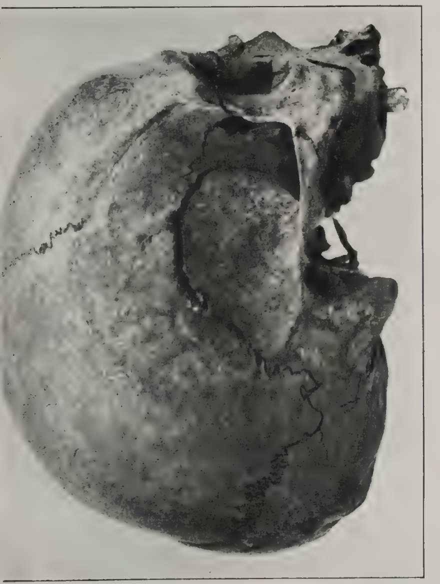

Fig. 173. $^{2}/_{5}$ nat. Norma temporalis dext.

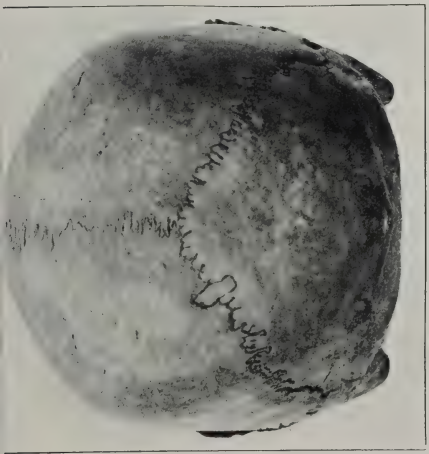

Fig. 174. $^{2}/_{5}$ nat. Norma occipitalis.

Herjolfsnes II. Fig. 175–177

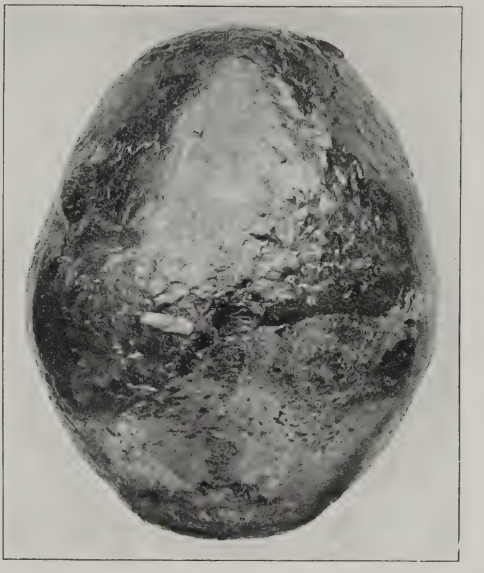

Fig. 175. $^{2}/_{5}$ nat. Norma parietalis.

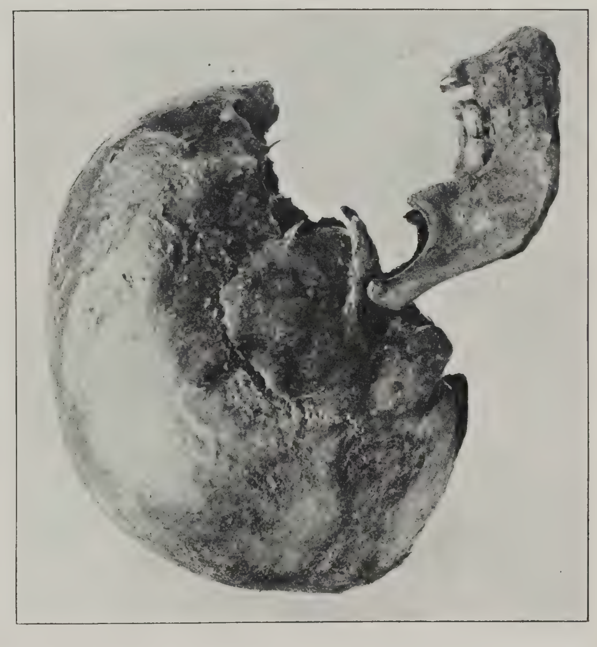

Fig. 176. $^{2}/_{5}$ nat. Norma temporalis dext.

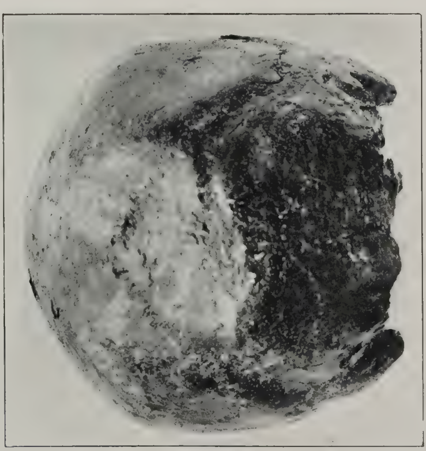

Fig. 177. $^{2}/_{5}$ nat. Norma occipitalis.

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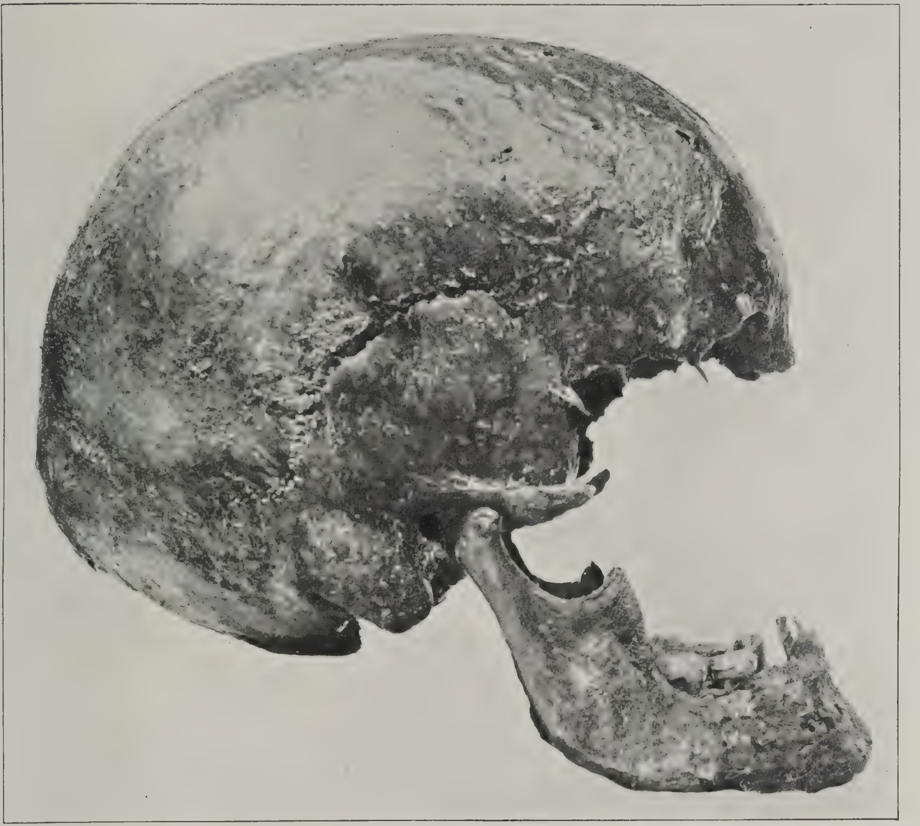
Herjolfsnes II. Fig. 178–179



ig. 178.
$^3/_5$ nat.
Norma
mporalis
dext.

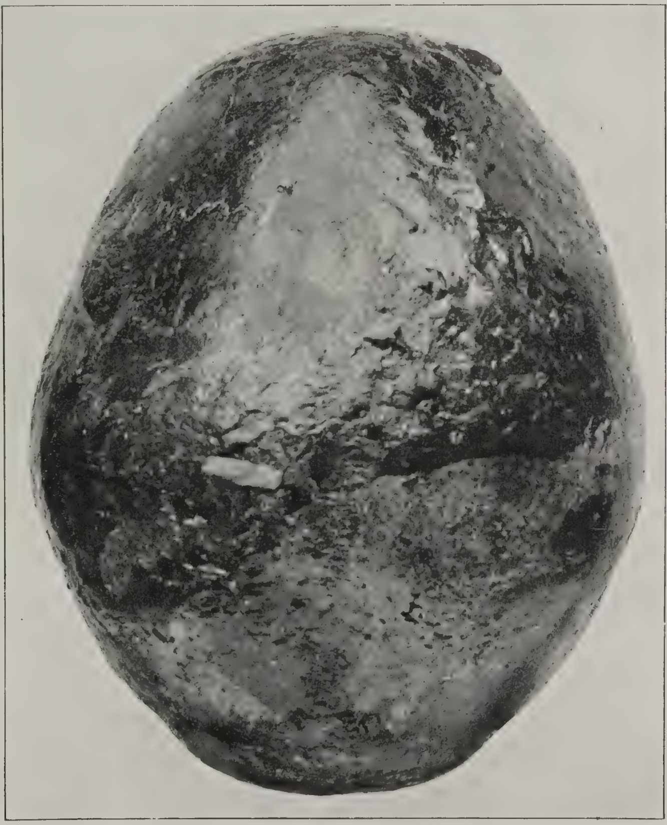


Fig. 179. $^3/_5$ nat.
Norma parietalis.

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Herjolfsnes II. Fig. 180–181

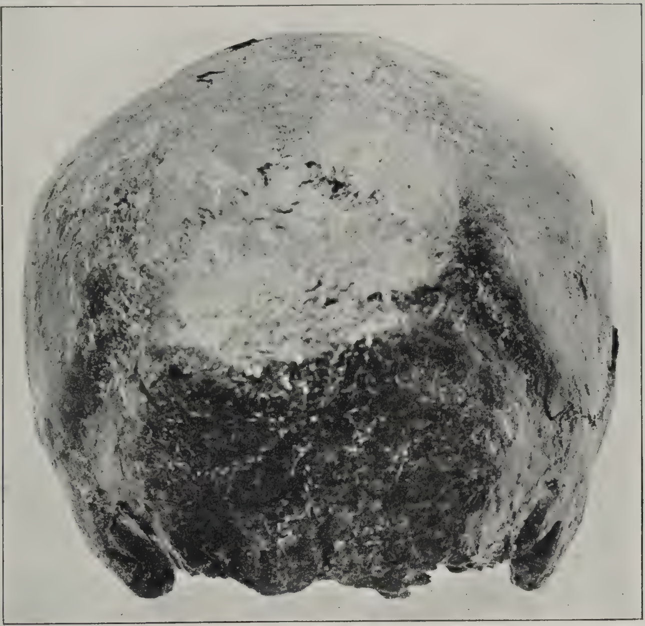

Fig. 180. 3/5 nat. Norma occipitalis.

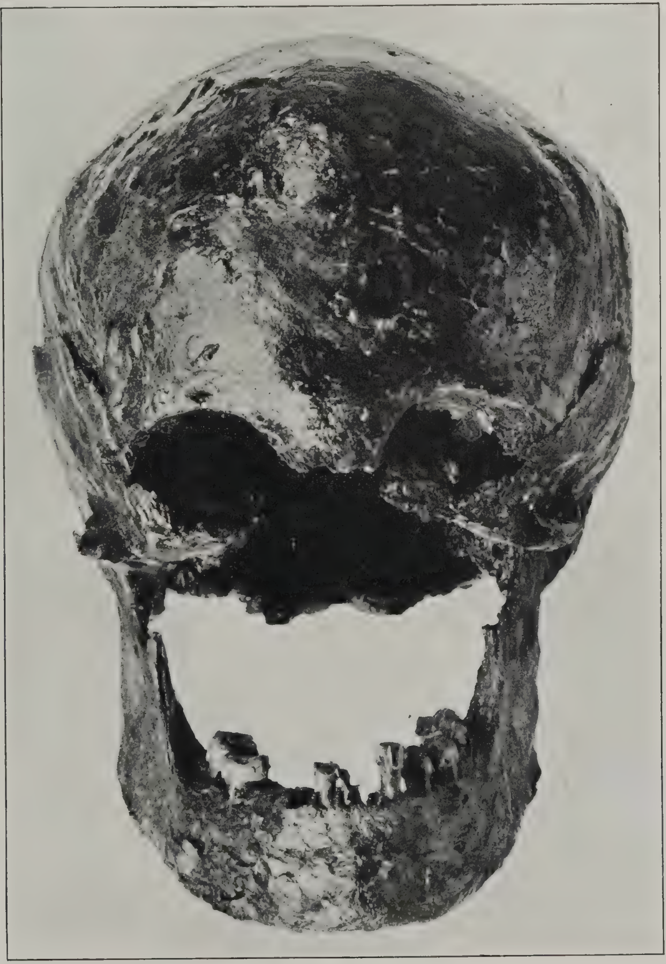

Fig. 181. 2/5 nat. Norma facialis.

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Herjolfsnes XVII. Fig. 182–184

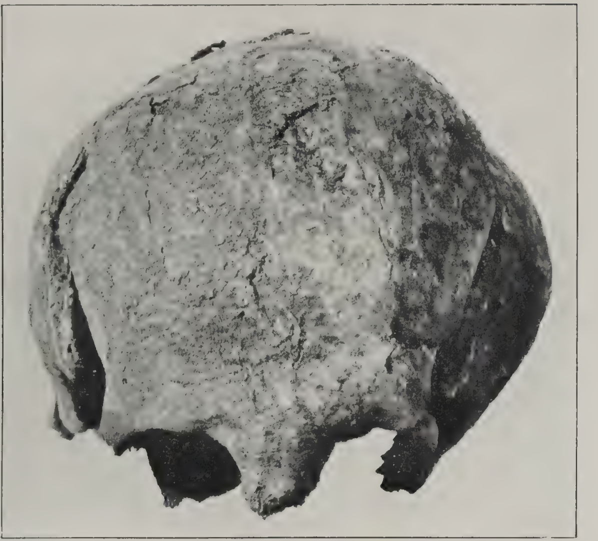

Fig. 182.
³/₅ nat.
Norma
frontalis.

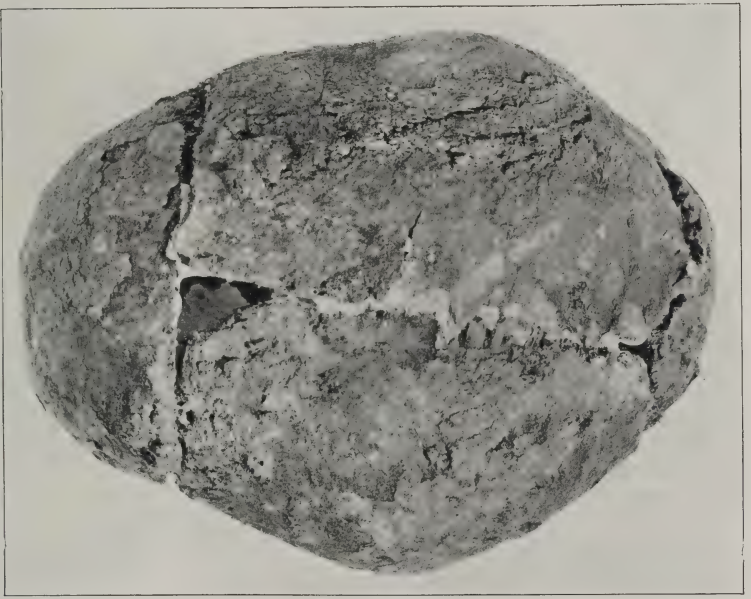

Fig. 183.
³/₅ nat.
Norma
parietalis.

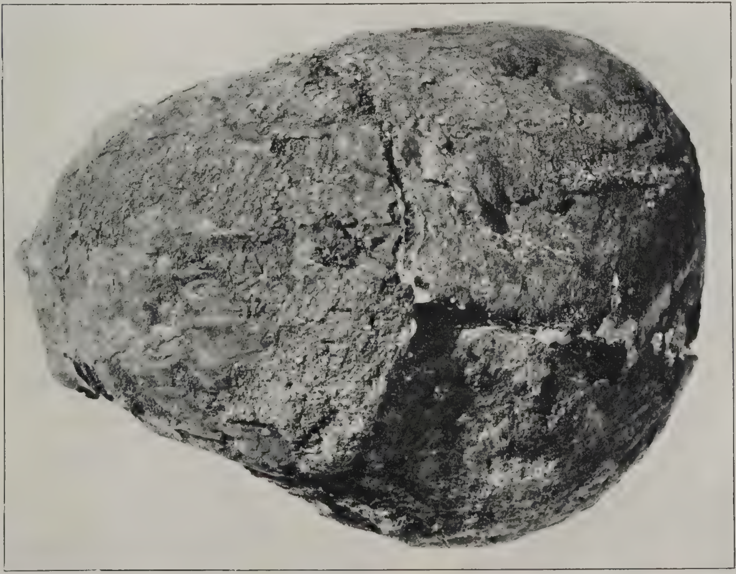

Fig. 184.
³/₅ nat.
Norma
fronto-
parietalis.

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Herjolfsnes LVII. Fig. 185–186

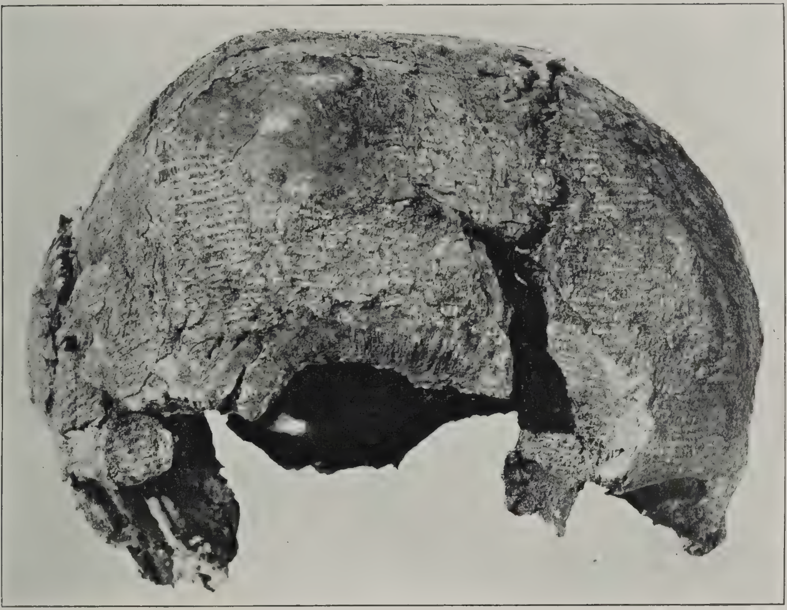

Fig. 185. ³/₅ nat. Norma temporalis dext.

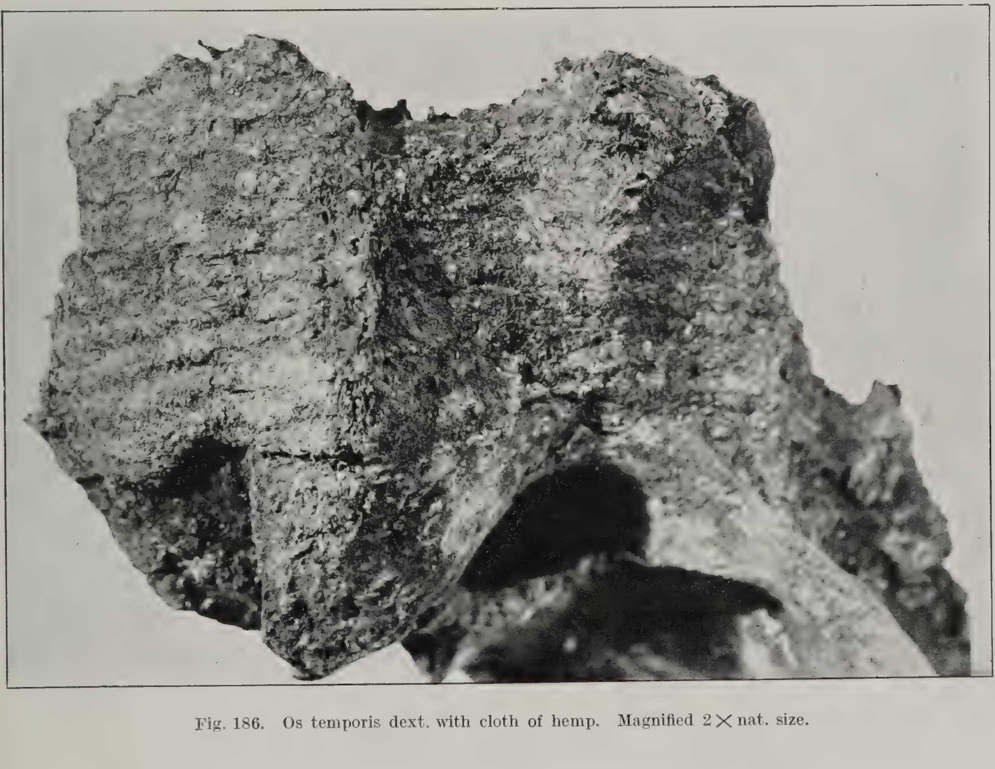

Fig. 186. Os temporis dext. with cloth of hemp. Magnified 2 × nat. size.

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Herjolfsnes XVII. Fig. 187–188

Frontal

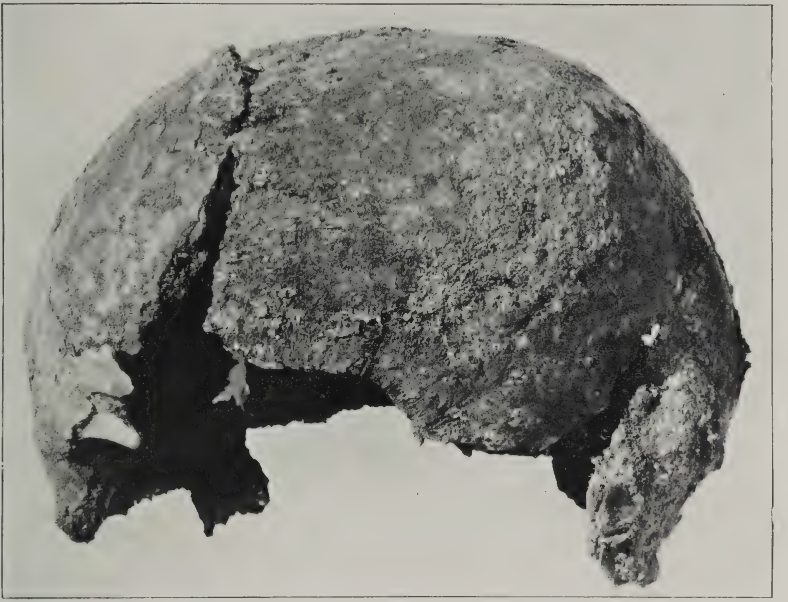

Fig. 187. 3/5 nat. Norma temporalis sin.

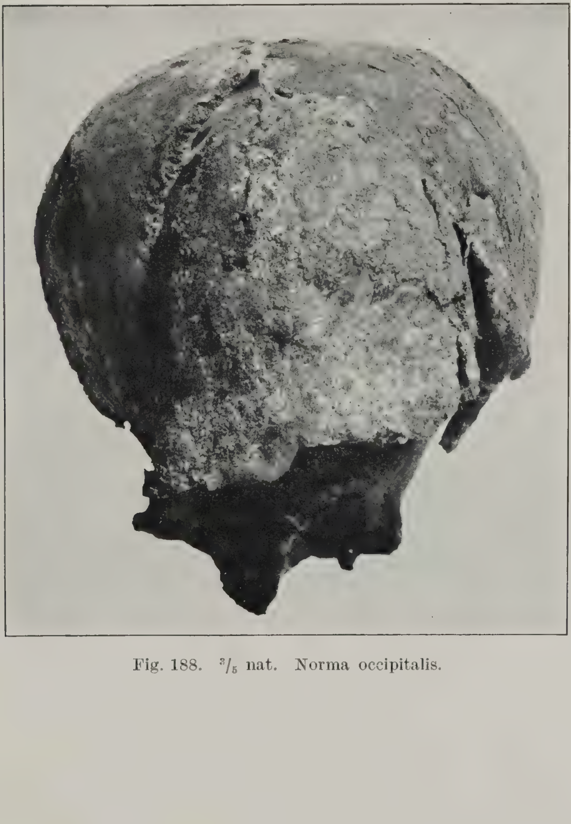

Fig. 188. 3/5 nat. Norma occipitalis.

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Herjolfsnes XVIII. Fig. 189–190

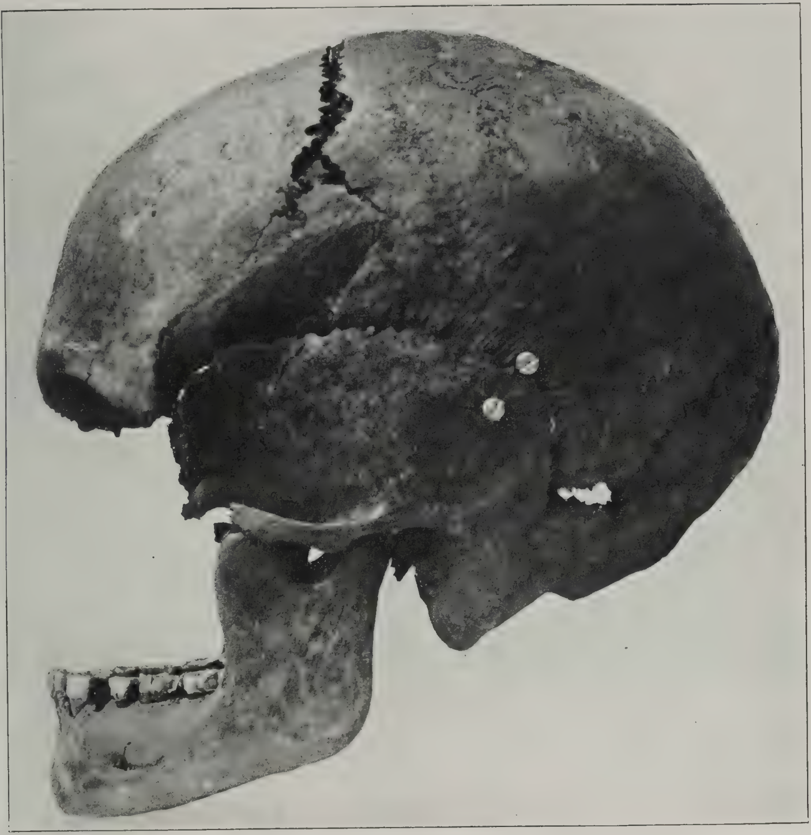

Fig. 189. $^3/_5$ nat. Norma temporalis sin.

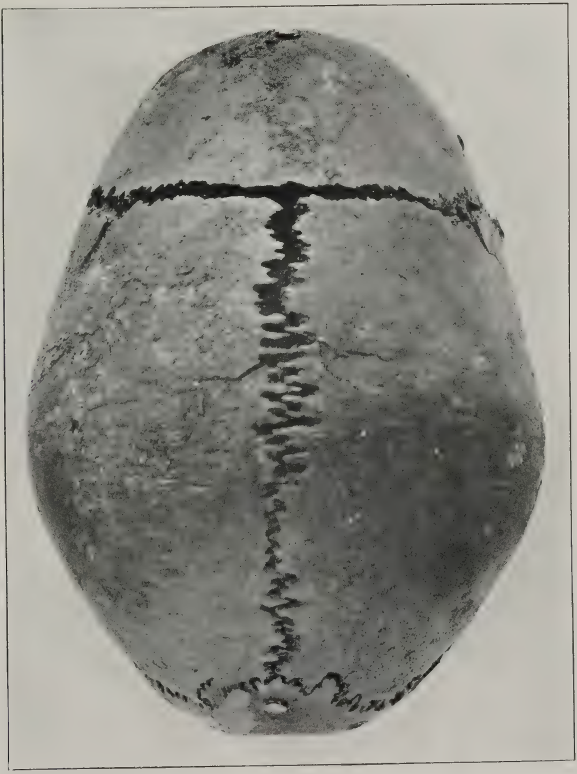

Fig. 190. $^3/_5$ nat. Norma parietalis.

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Herjolfsnes XVIII. Fig. 191–192

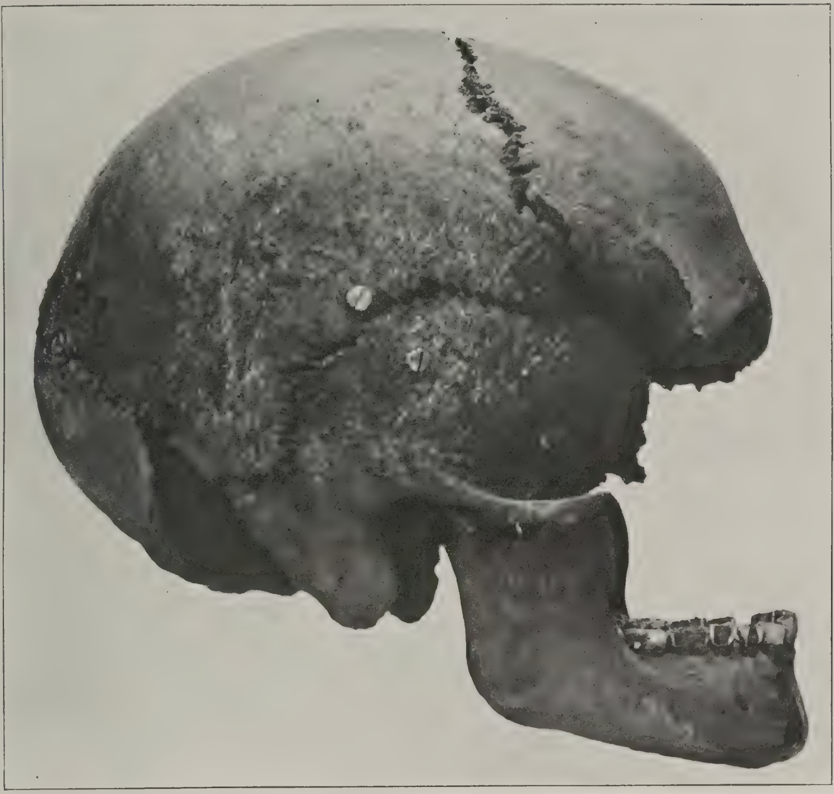

Fig. 191. $^3/_5$ nat. Norma temporalis dext.

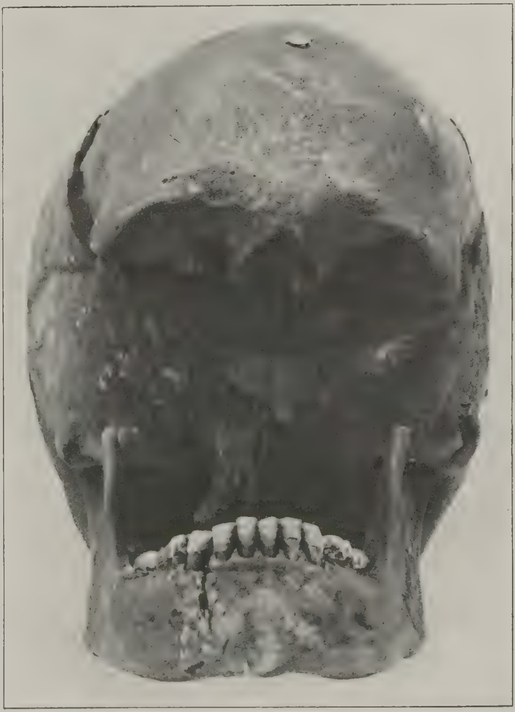

Fig. 192. ca. $^1/_2$ nat. Norma facialis.

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Herjolfsnes XVIII. Fig. 193–195

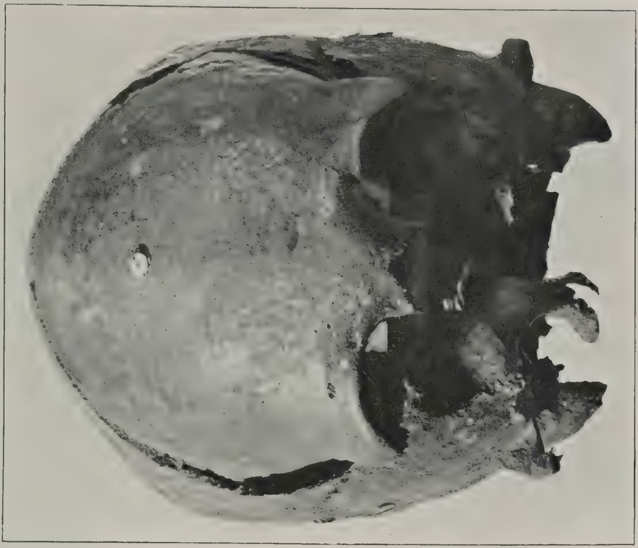

Fig. 193. $^{3}/_{5}$ nat. Norma frontalis.

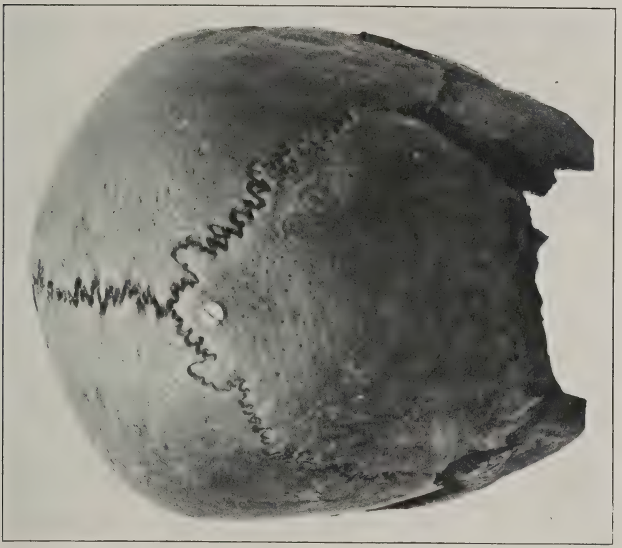

Fig. 194. $^{3}/_{5}$ nat. Norma occipitalis I.

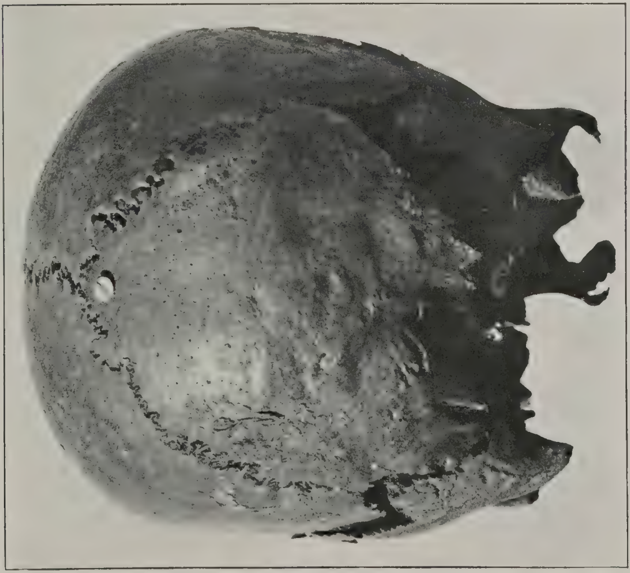

Fig. 195. $^{3}/_{5}$ nat. Norma occipitalis II.

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Herjolfsnes X and XX. Fig. 196–198

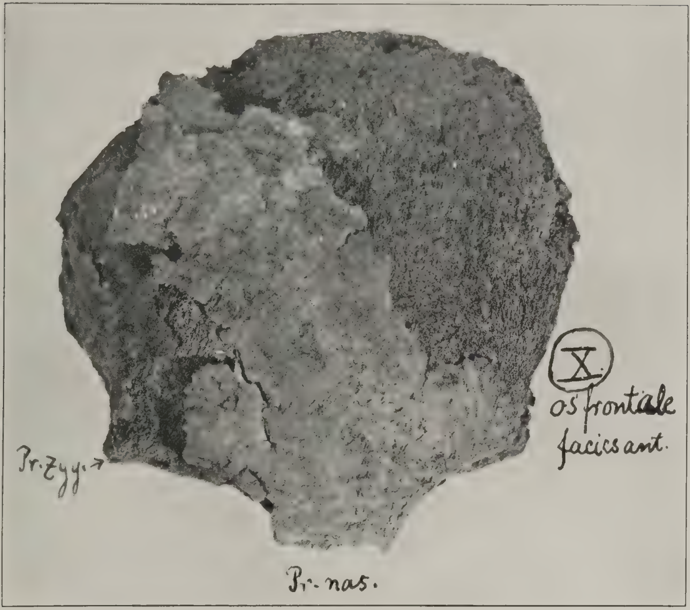


Fig. 196.
ca. $^3/_4$ nat.
Os frontale,
facies ant.
(Case X).

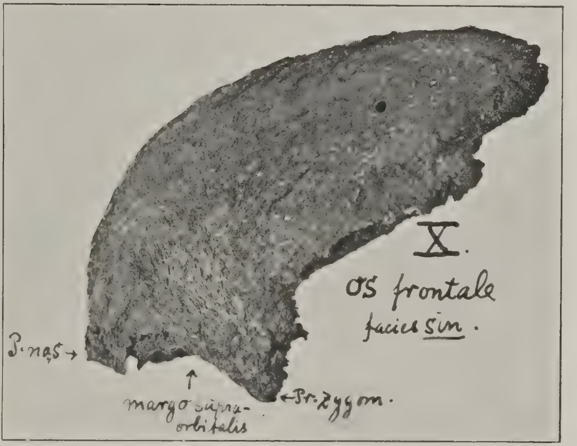
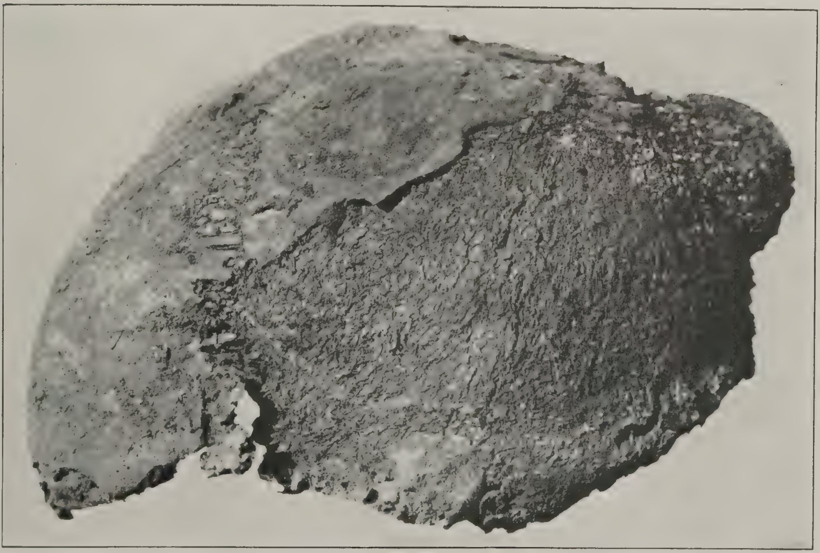


Fig. 197.
ca. $^3/_4$ nat. Os
frontale, facies
sin. (Case X).



. 198. $^5/_7$ nat.
frontale + os
arietale sin.
teral aspect.
Case XX).

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TEETH AND JAWS

TABULA LXVIII—LXXXIV

WITH

FIGURES 199—255

TABULA LXVIII—LXIX: *ESKIMOS, male and female,* fig. 199—202.
TABULA LXX: *DANISH MEDIEVAL MAN. (Særslev),* fig. 203—204.
TABULA LXXI: *HERJOLFSNES II,* fig. 205—208.
TABULA LXXII—LXXIV: *HERJOLFSNES X,* fig. 209—222.
TABULA LXXV—LXXVIII: *HERJOLFSNES XVII,* fig. 223—236.
TABULA LXXIX—LXXX: *HERJOLFSNES XVIII,* fig. 237—243.
TABULA LXXXI—LXXXIV: *HERJOLFSNES XX,* fig. 244—255.

Teeth and Jaws. Fig. 199–200

Eskimo ♂ 30—35 years. Ivigtut.

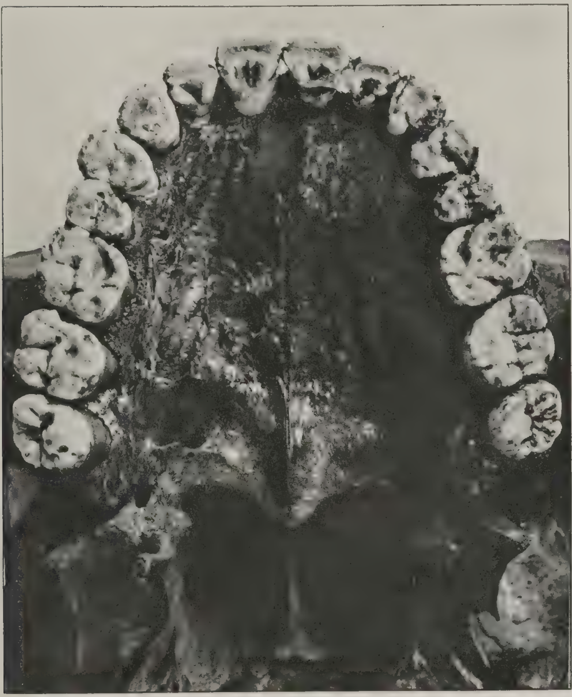

Fig. 199. $^1/_1$ nat. Maxilla sup. Facies masticatoria dentium.

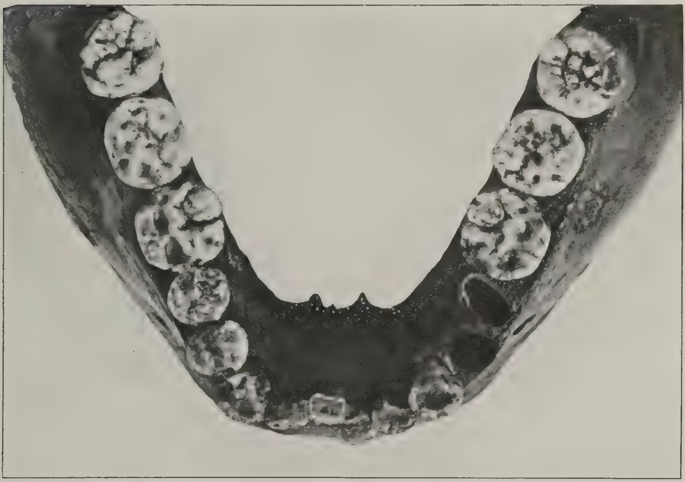

Fig. 200. $^1/_1$ nat Mandibula. Facies masticatoria dentium.

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Teeth and jaws. Fig. 201—202

Eskimo ♀ 30-40 years. Ivigtut.

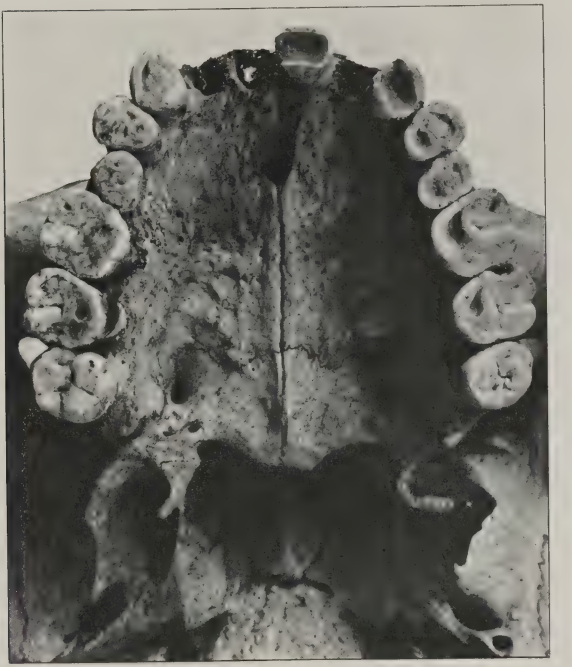

Fig. 201. $^1/_1$ nat. Maxilla sup. Facies masticatoria dentium.

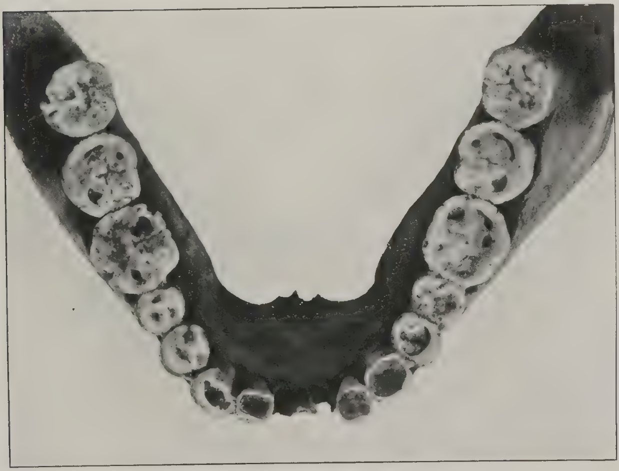

Fig. 202. $^1/_1$ nat. Mandibula. Facies masticatoria dentium.

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Teeth and jaws. Fig. 203—204.

Denmark. Særslev, medieval ♂ 13th century.

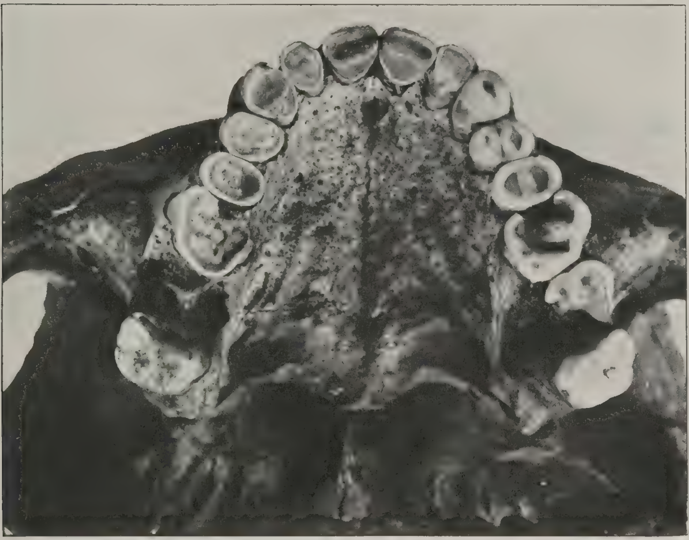

Fig. 203. $^1/_1$ nat. Maxilla sup. Facies masticatoria dentium.

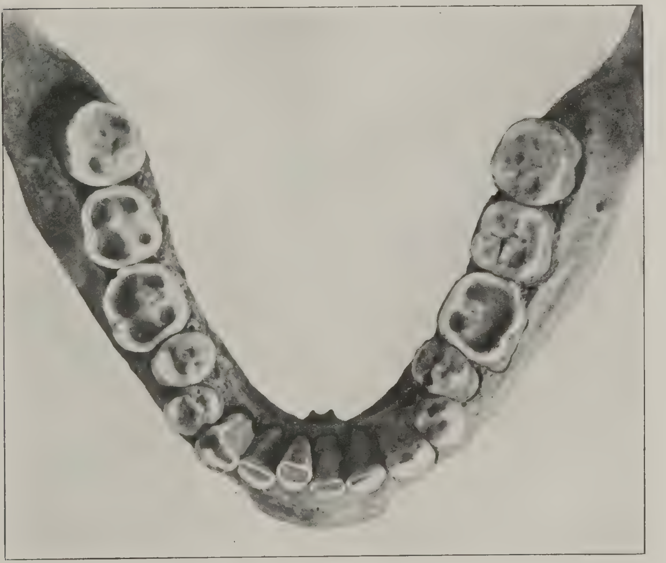

Fig. 204. $^1/_1$ nat. Mandibula. Facies masticatoria dentium.

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Teeth and Jaws

Herjolfsnes II. Fig. 205–208

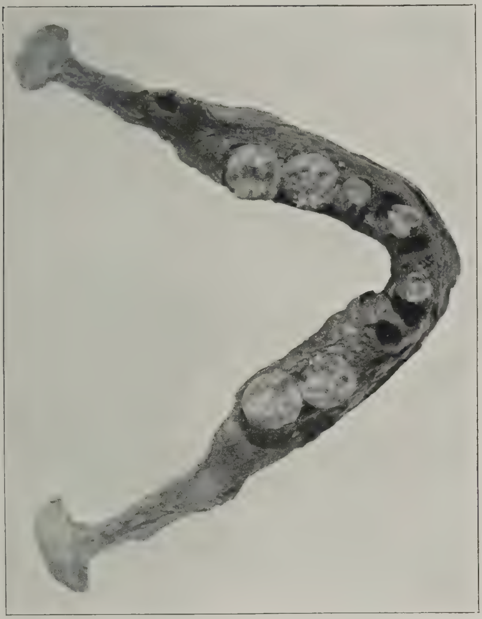

Fig. 205. $^{2}/_{3}$ nat. Mandibula.

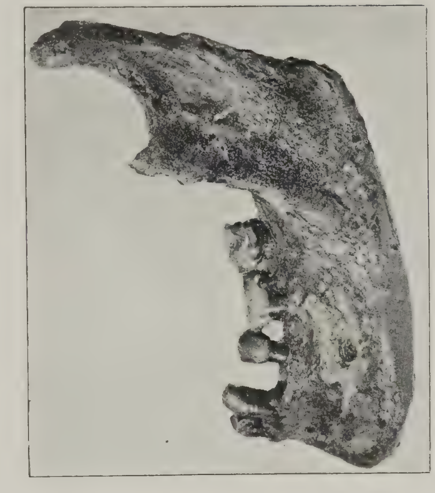

Fig. 206. $^{2}/_{3}$ nat. Mandibula sin.

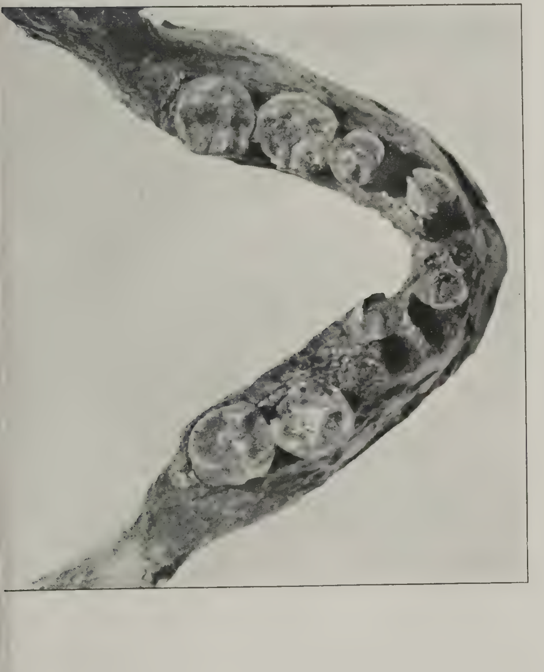

Fig. 208. $^{1}/_{1}$ nat. Mandibula. Facies masticatoria dentium.

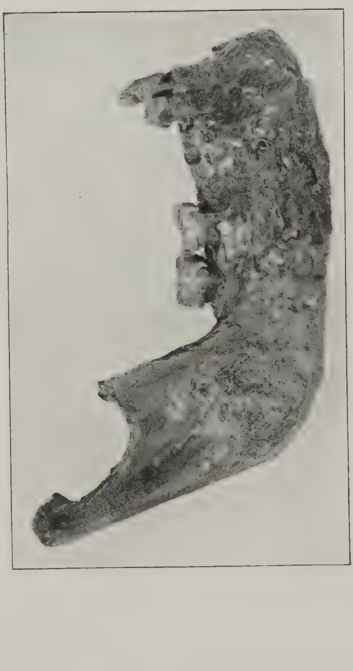

Fig. 207. $^{2}/_{3}$ nat. Mandibula dext.

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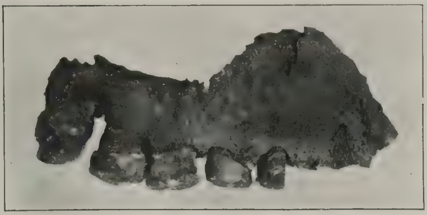
Teeth and Jaws
Herjolfsnes X. Fig. 209–215

Fig. 209.
$^{1}/_{1}$ nat.
laxilla dext.
lat.



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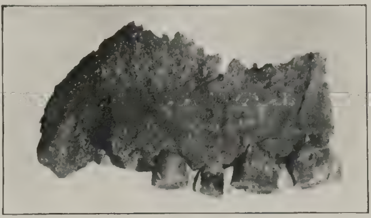
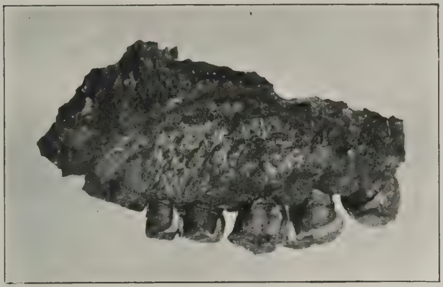


Fig. 210.
$^{1}/_{1}$ nat.
Maxilla sin.
lat.

Fig. 211.
$^{1}/_{1}$ nat.
axilla dext.
med.



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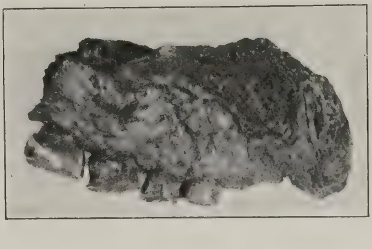
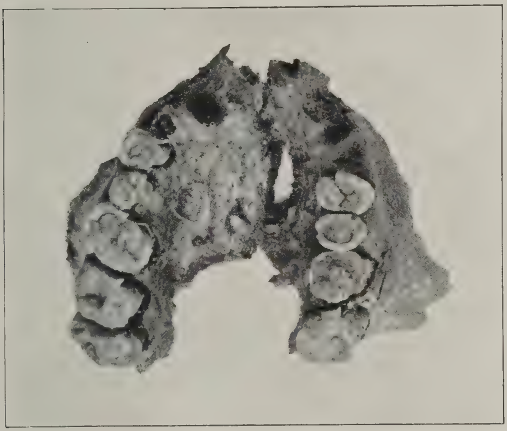


Fig. 212.
$^{1}/_{1}$ nat.
Maxilla sin.
med.

ig. 213.
$_{10}$ nat.
laxilla
A.



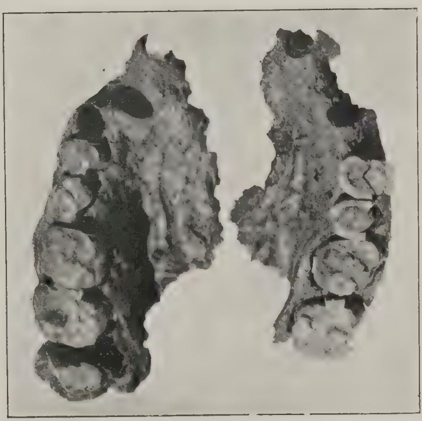
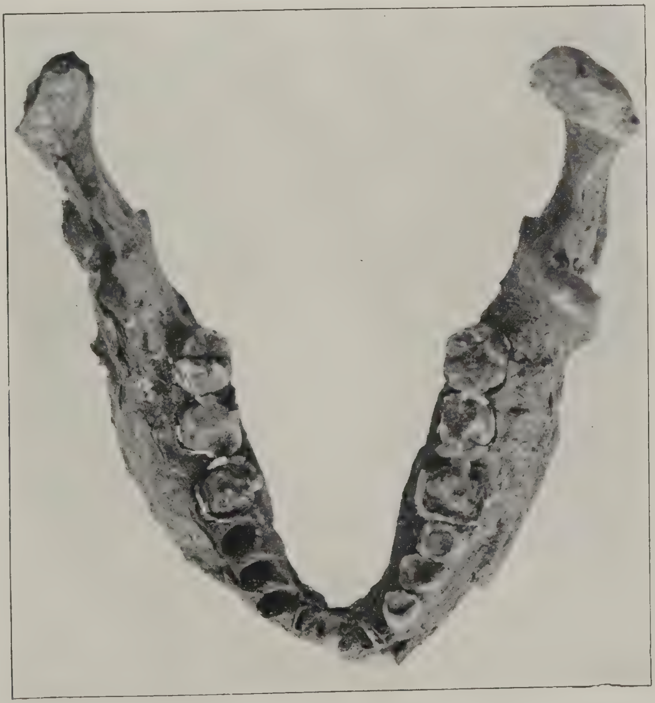


Fig. 214.
$^{1}/_{1}$ nat.
Maxilla
B.

Fig. 215.
ca $^{9}/_{10}$ nat.
Mandibula.



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Teeth and Jaws

Herjolfsnes X. Fig. 216–219

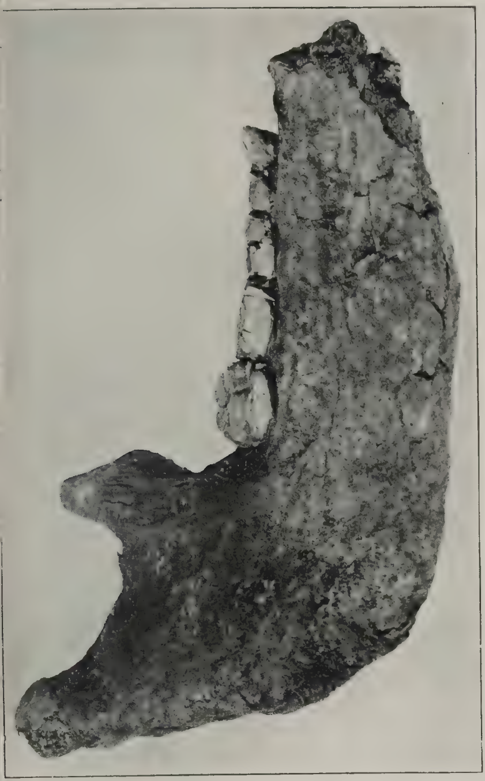

Fig. 216. $^1/_1$ nat. Mandibula sin. med.

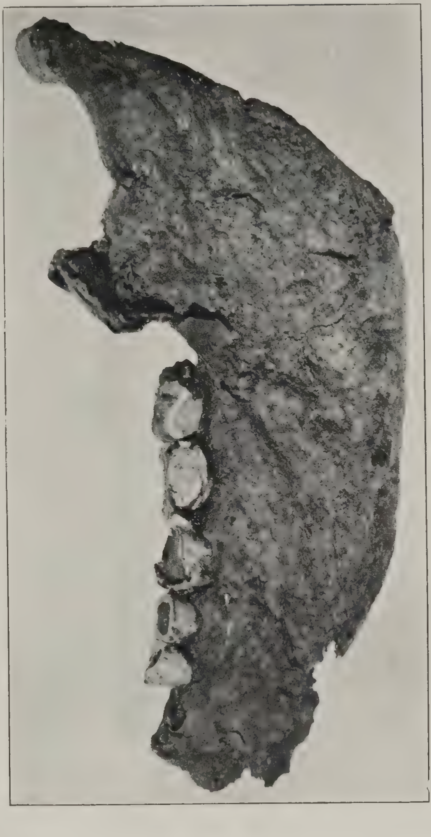

Fig. 217. $^1/_1$ nat. Mandibula sin. lat.

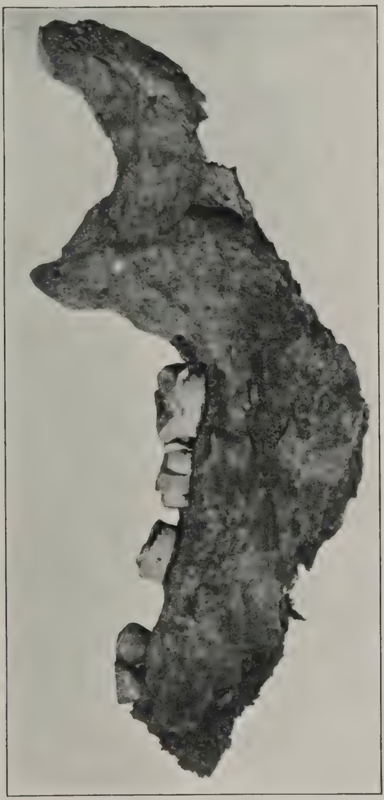

Fig. 218. $^1/_1$ nat. Mandibula dext. med.

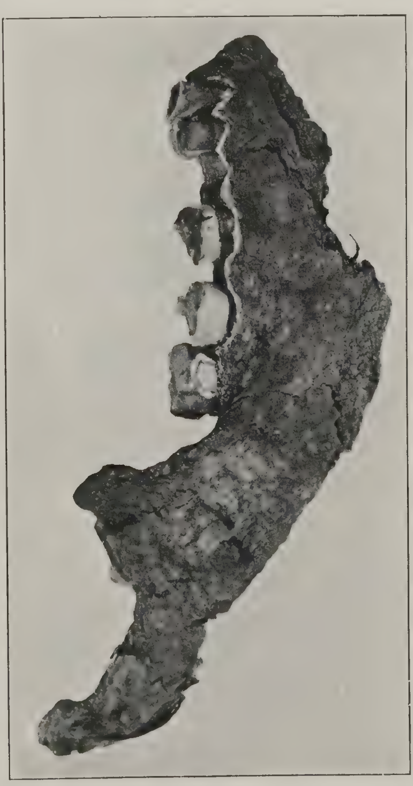

Fig. 219. $^1/_1$ nat. Mandibula dext. lat.

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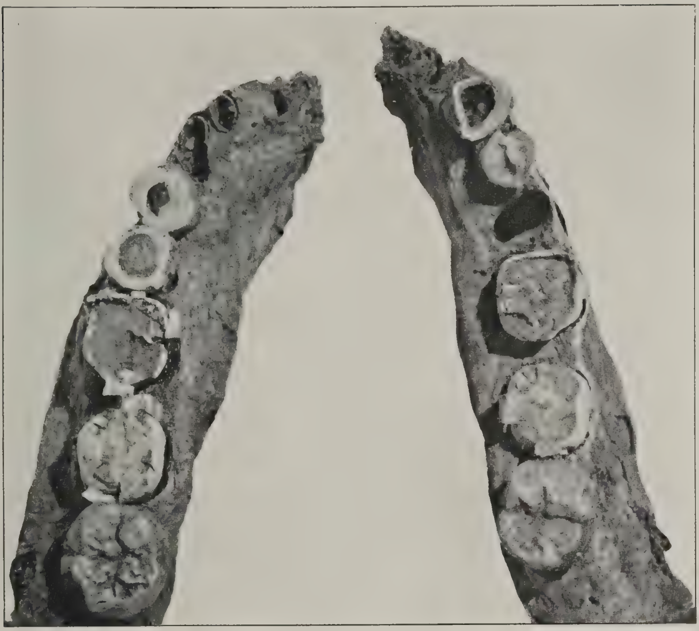
Herjolfsnes X. Fig. 220–222



sin. Fig. 220. $^3/_2$ nat. Mandibula. Facies masticatoria. dext.

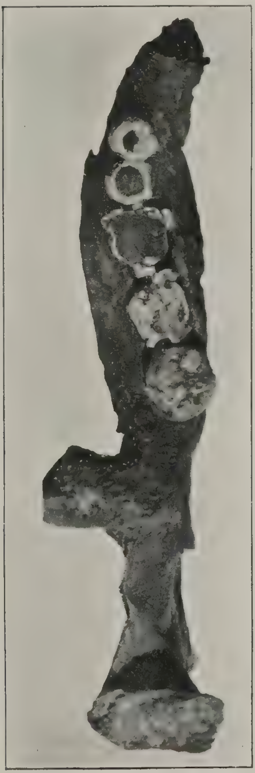


Fig. 221. $^1/_1$ nat. Mandibula sin.

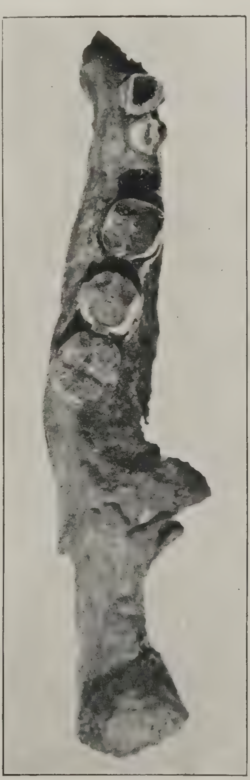


Fig. 222. $^1/_1$ nat. Mandibula dext.

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Teeth and Jaws
Herjolfsnes XVII. Fig. 223–227

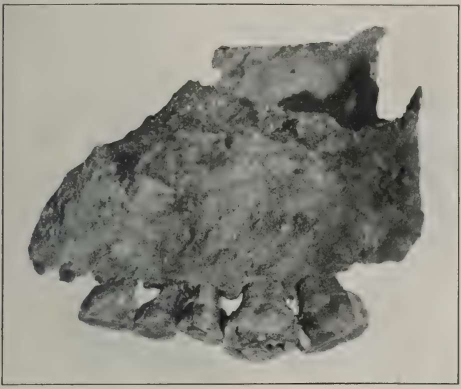

Fig. 223. $^1/_1$ nat. Maxilla dext. med.

post. ←→

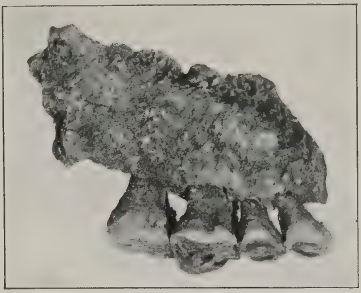

Fig. 224. $^1/_1$ nat. Maxilla sin. med.

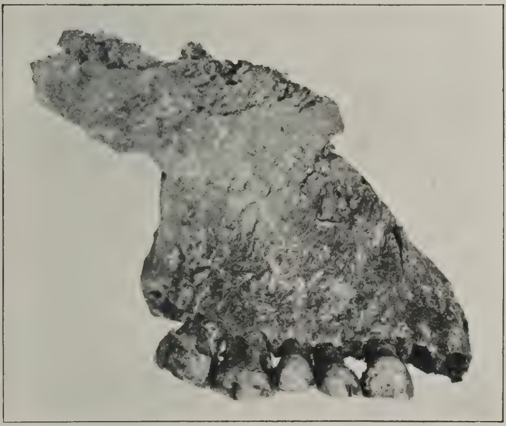

Fig. 225. $^1/_1$ nat. Maxilla dext. lat.

ant. ←→

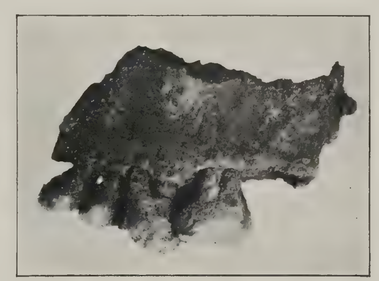

Fig. 226. $^1/_1$ nat. Maxilla sin. lat.

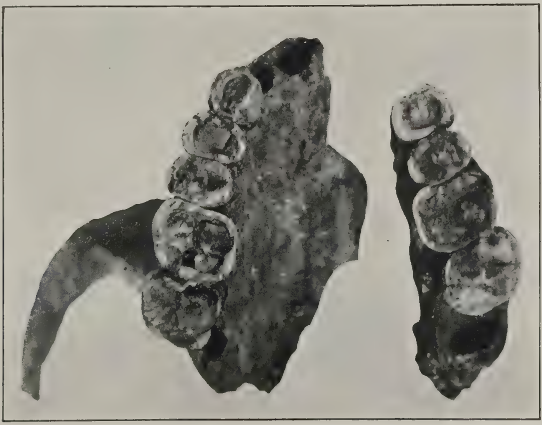

Fig. 227 $^1/_1$ nat. Maxilla, inferior aspect.

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Herjolfsnes XVII. Fig. 228–229

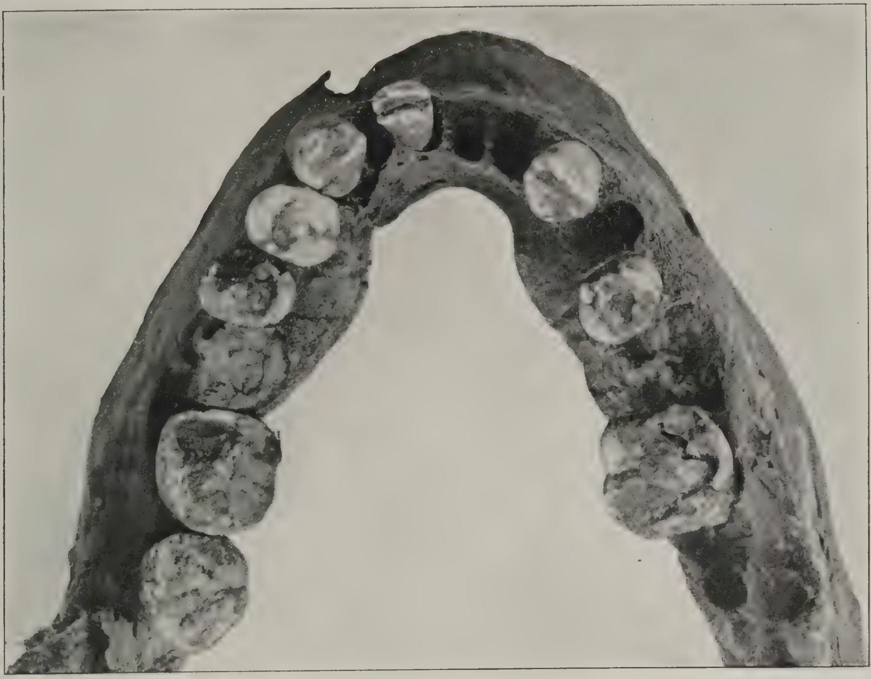

Fig. 228. $^3/_2$ nat. Mandibula. Facies masticatoria.

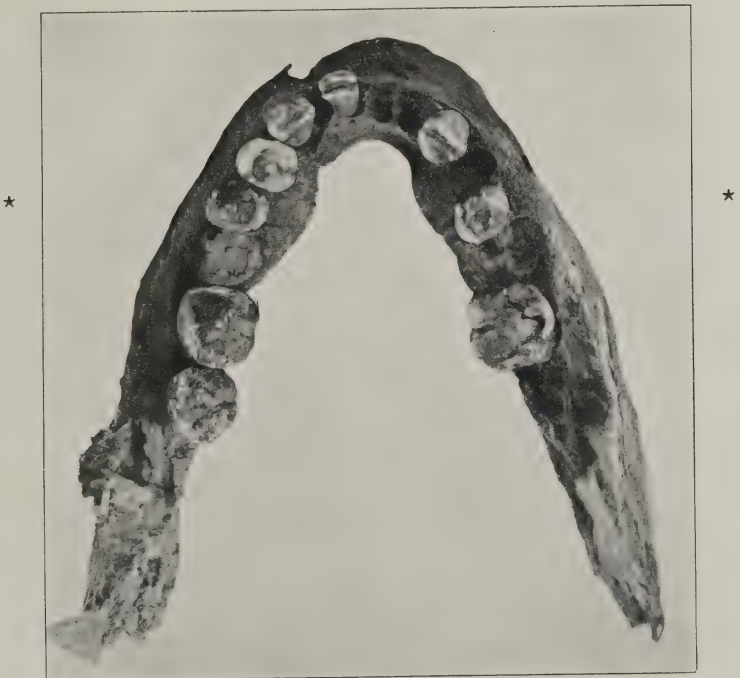

Fig. 229. $^1/_1$ nat. Mandibula.
NB. ✶ Torus mandibularis!

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Herjolfsnes XVII. Fig. 230–233

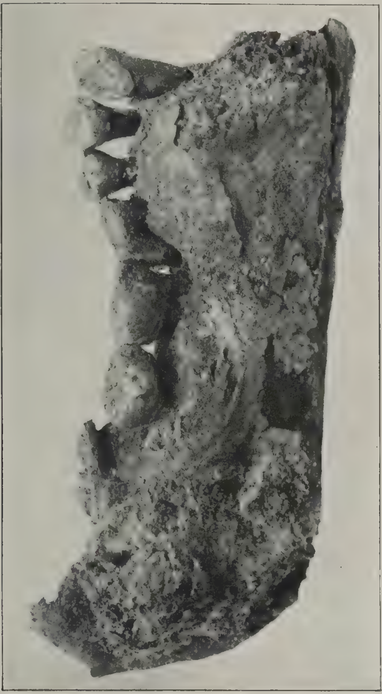
Fig. 230. $^{1}/_{1}$ nat. Mandibula sin. med.

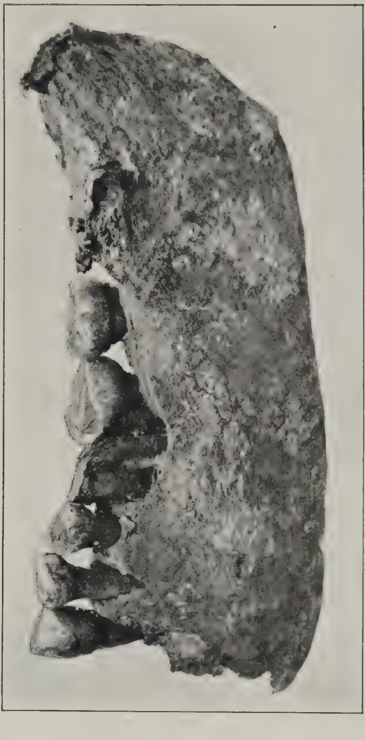
Fig. 231. $^{1}/_{1}$ nat. Mandibula sin. lat.

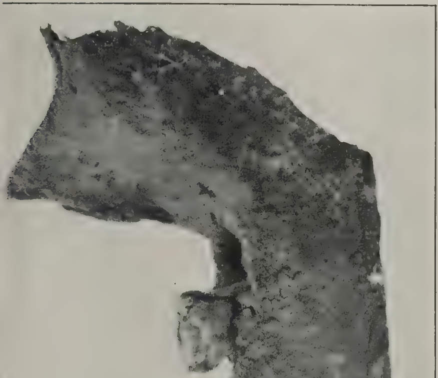
Fig. 232. $^{1}/_{1}$ nat. Mandibula dext. med.

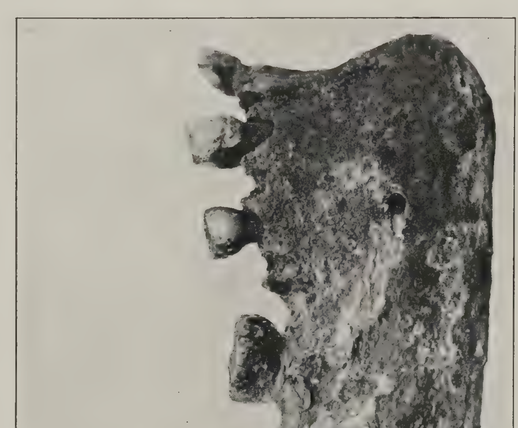
Fig. 233. $^{1}/_{1}$ nat. Mandibula dext. lat.

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Herjolfsnes XVII. Fig. 234–236

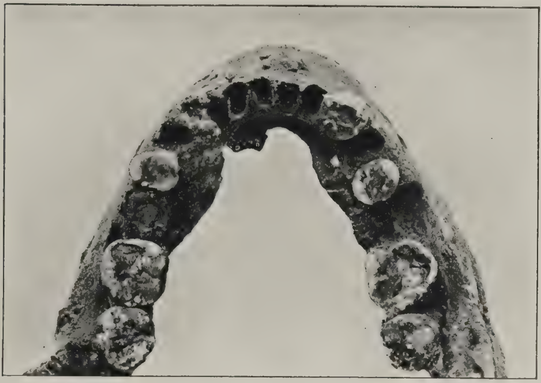
★  ★

Fig. 234. ca. 0,85 nat. Mandibula.
NB. ✶ Torus mandibularis!

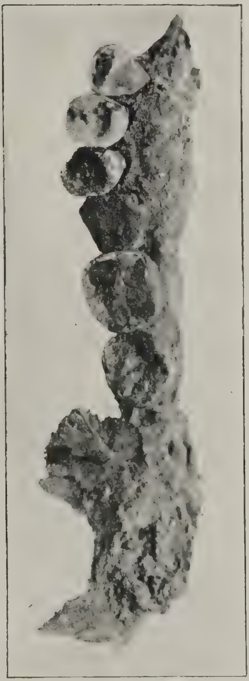


Fig. 235. $^1/_1$ nat.
Mandibula. sin.

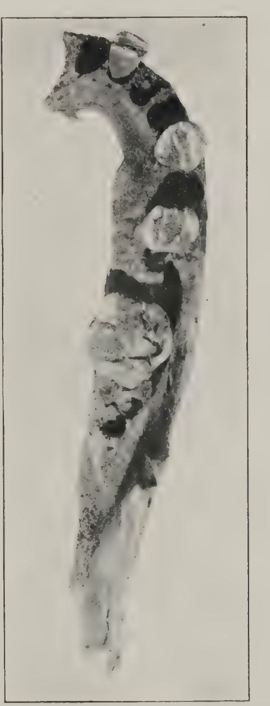


Fig. 236. $^1/_1$ nat.
Mandibula dext.

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Herjolfsnes XVIII. Fig. 237–239

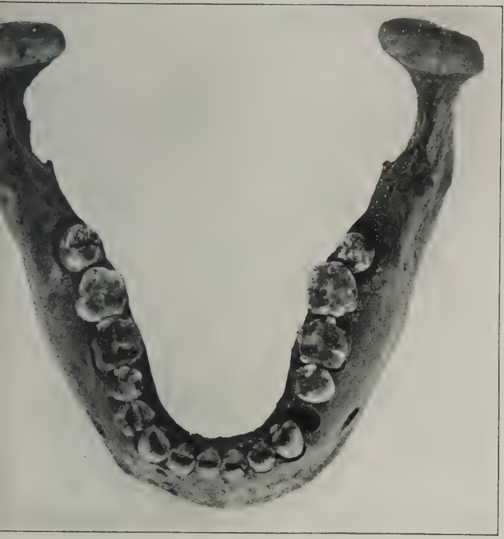

Fig. 237. ca. $^2/_3$ nat. Mandibula, A.

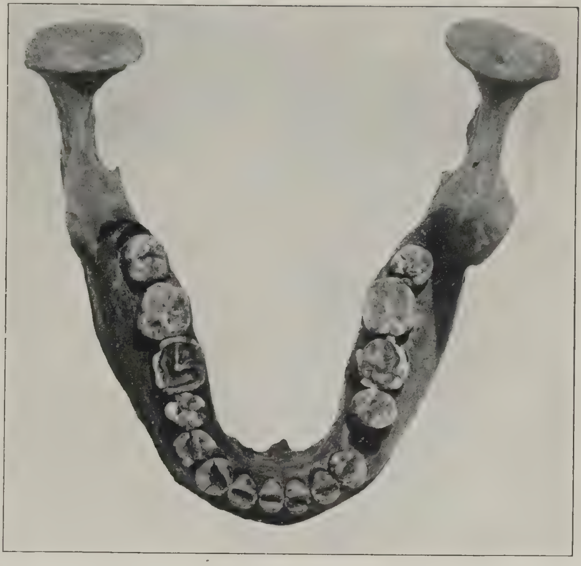

Fig. 238. ca. $^2/_3$ nat. Mandibula, B.

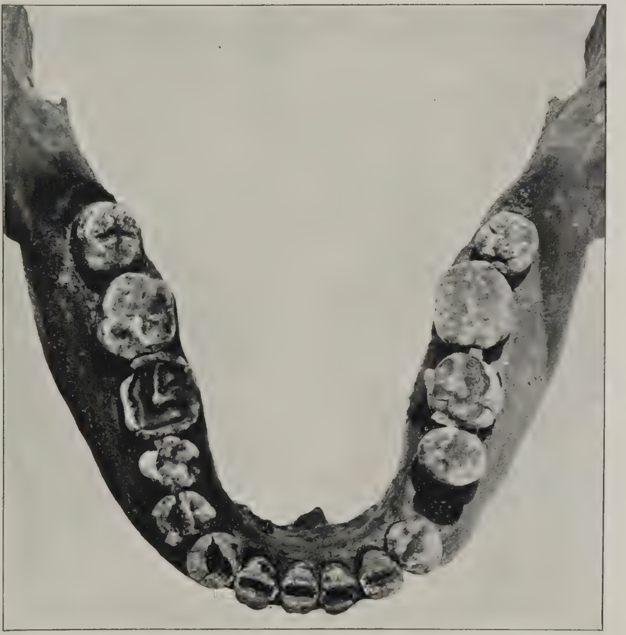

Fig. 239. $^1/_1$ nat. Mandibula, C.
Facies masticatoria.

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Herjolfsnes XVIII. Fig. 240–243

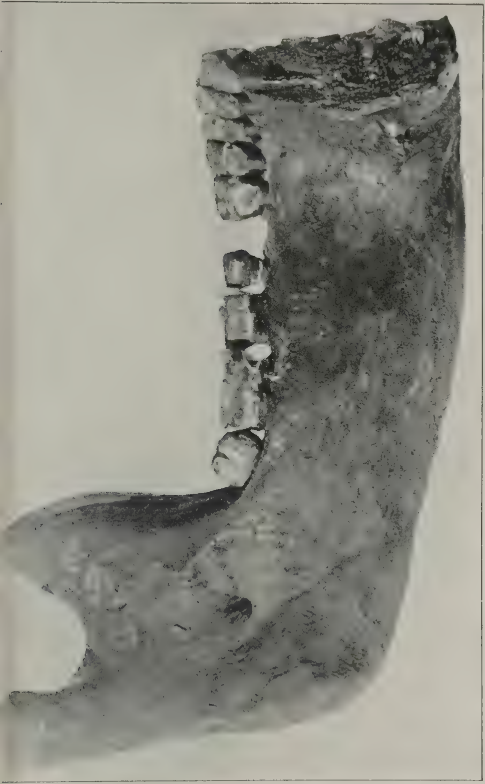

Fig. 240. $^{1}/_{1}$ nat. Mandibula sin. med.

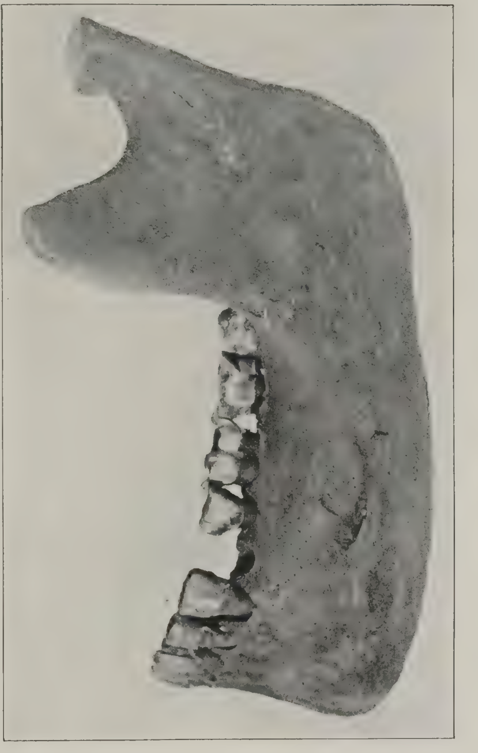

Fig. 241. $^{1}/_{1}$ nat. Mandibula sin. lat.

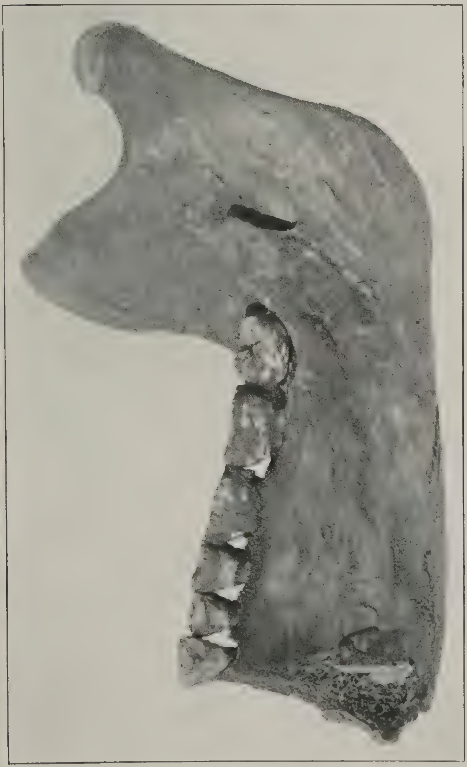

Fig. 242. $^{1}/_{1}$ nat. Mandibula dext. med.

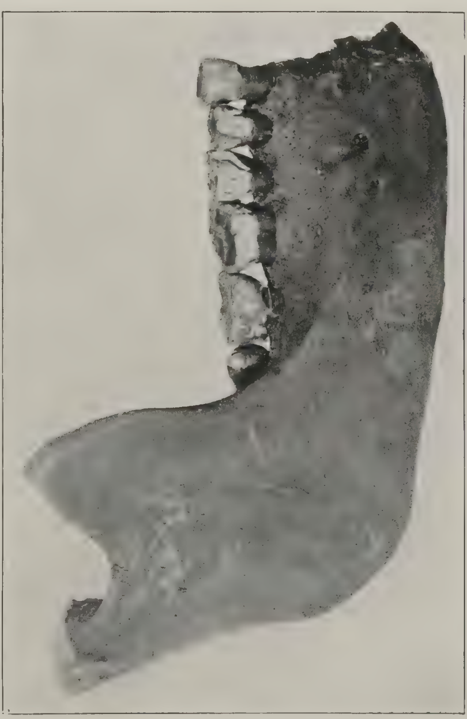

Fig. 243. $^{1}/_{1}$ nat. Mandibula dext. lat.

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Herjolfsnes XX. Fig. 244–247

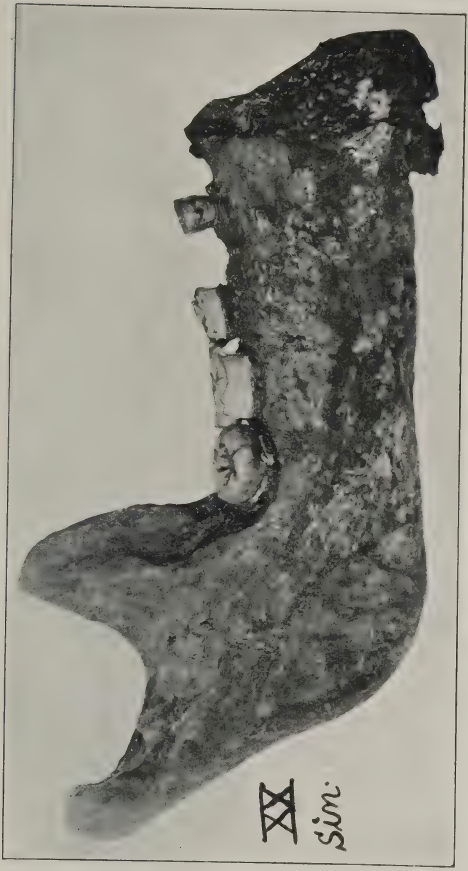

Fig. 244. $^1/_1$ nat. Mandibula sin. med.

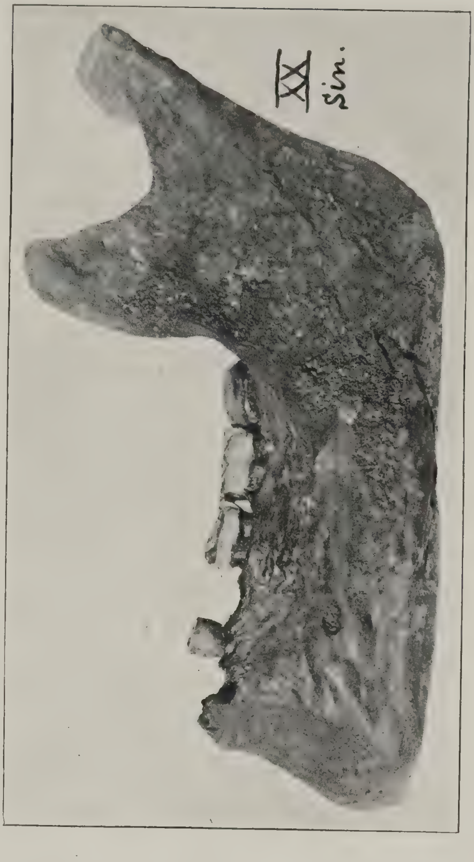

Fig. 245. $^1/_1$ nat. Mandibula sin. lat.

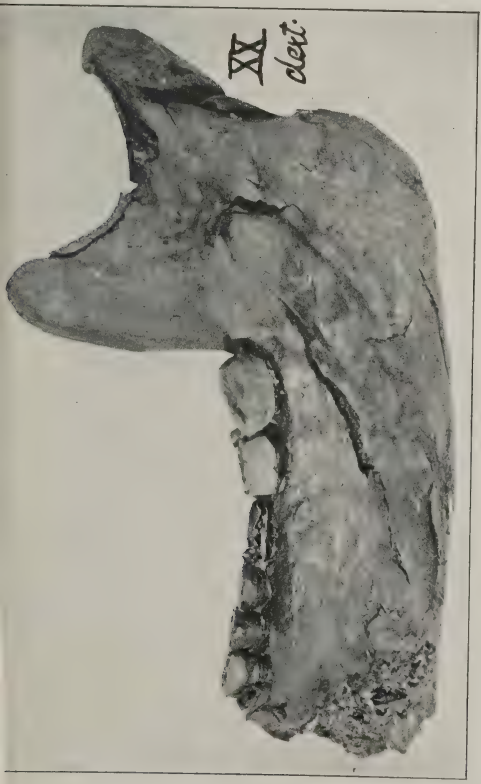

Fig 246. $^1/_1$ nat. Mandibula dext. med.

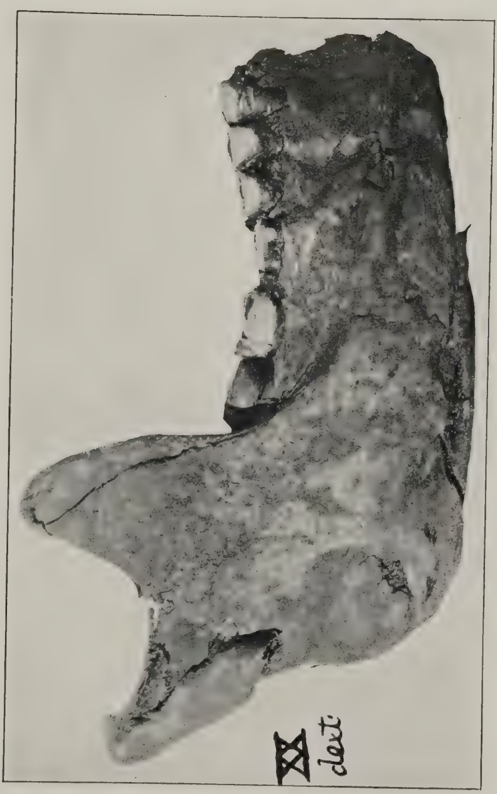

Fig. 247. $^1/_1$ nat. Mandibula dext. lat.

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Herjolfsnes XX. Fig. 248–249

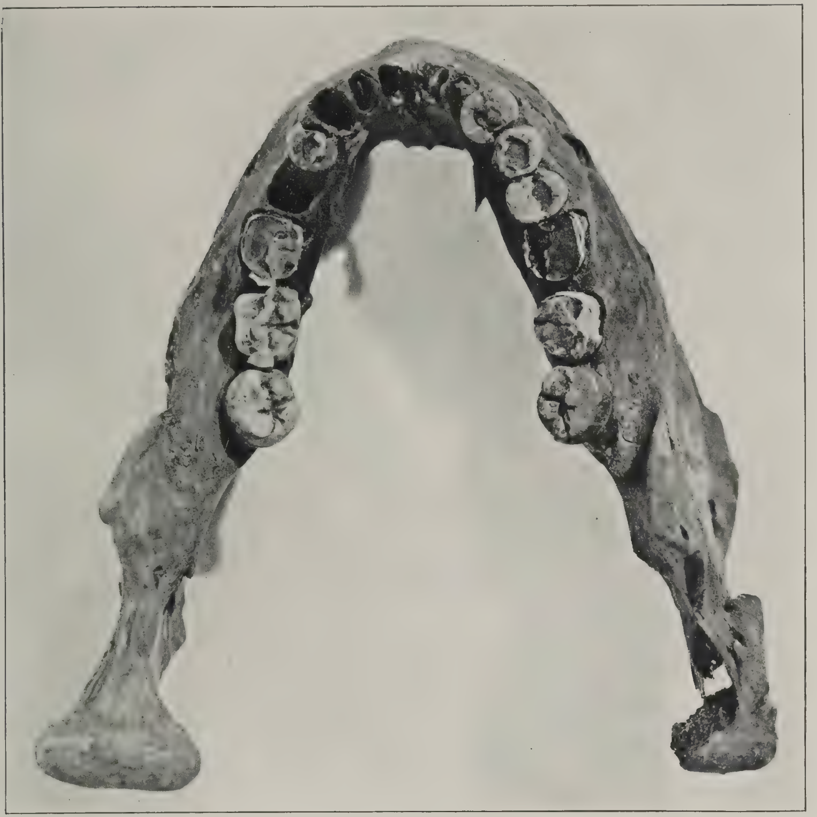

Fig. 248. $^1/_1$ nat. Mandibula. Facies masticatoria dentium.

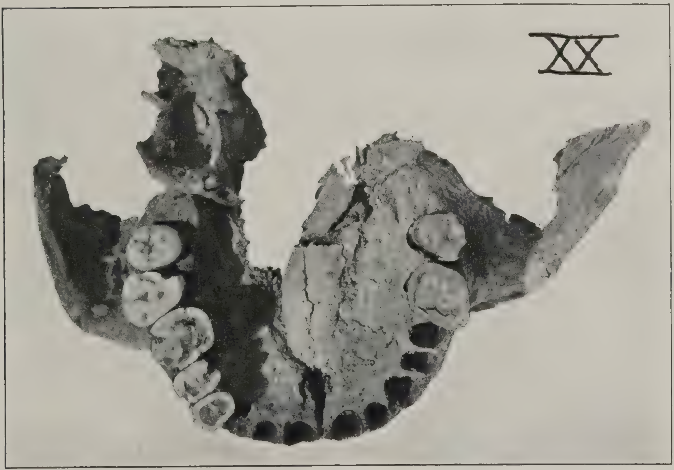

Fig. 249. **4/5 nat.** Maxilla. Inferior aspect.

Teeth and Jaws

Herjolfsnes XX. Fig. 250–252

ant.

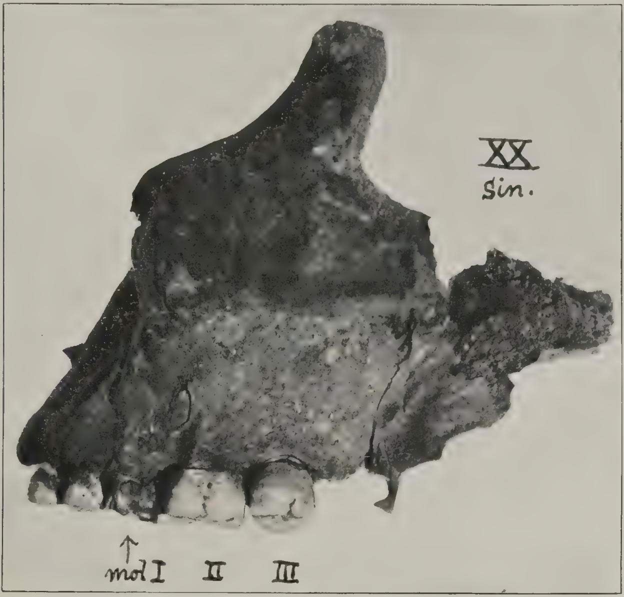

Fig. 250. $^{11}/_{10}$ nat. Maxilla sin. lat.

ant.

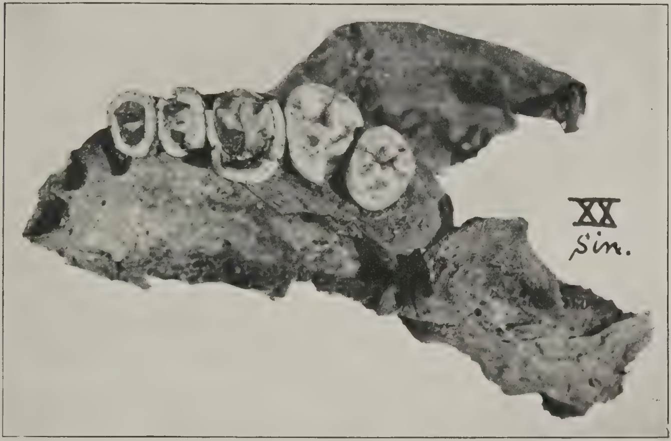

Fig. 251. $^{11}/_{10}$ nat. Maxilla sin. Facies masticatoria.

post.

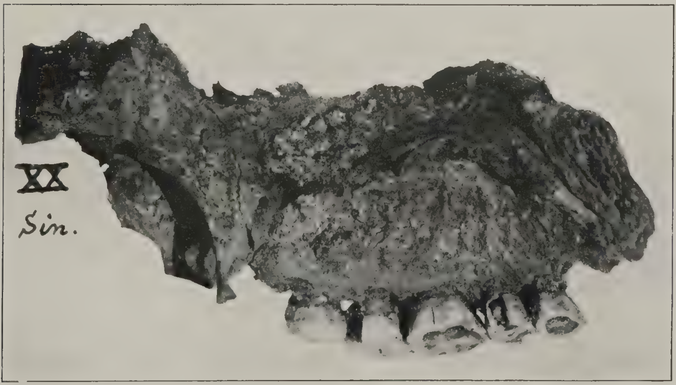

Fig. 252. $^{11}/_{10}$ nat. Maxilla sin. med.

Teeth and Jaws

Herjolfsnes XX. Fig. 253–255

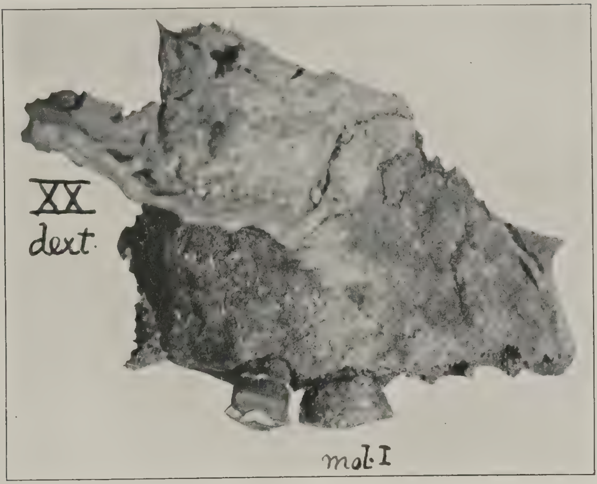

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Fig. 253. $^{11}/_{10}$ nat. Maxilla dext. lat.

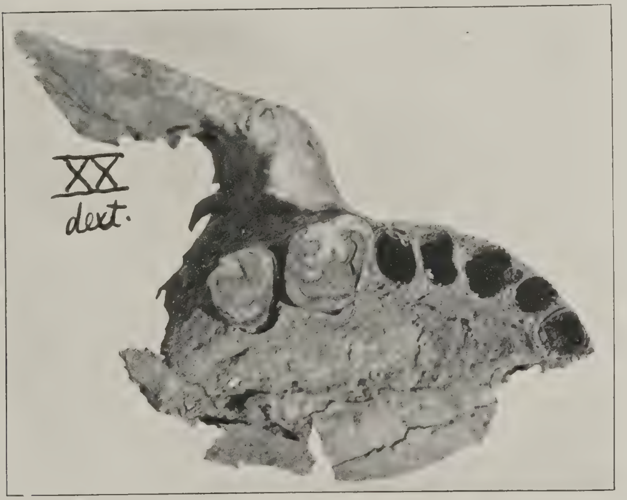

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Fig. 254. $^{11}/_{10}$ nat. Maxilla dext. Facies masticatoria.

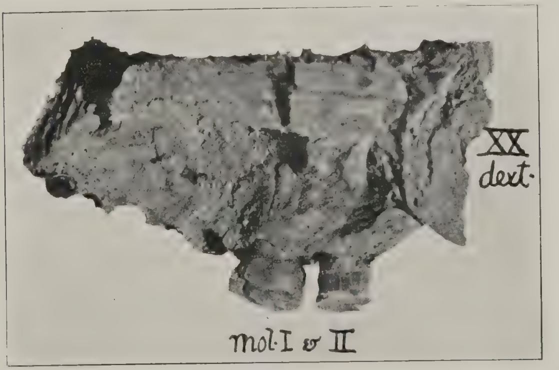

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Fig. 255. $^{11}/_{10}$ nat. Maxilla dext. med.

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MICROPHOTOS

TABULA LXXXV

HERJOLFSNES I, fig. 256—258.
HERJOLFSNES X, fig. 259.

MICROPHOTOS

Herjolfsnes I (Fig. 256–258) and X (Fig. 259)

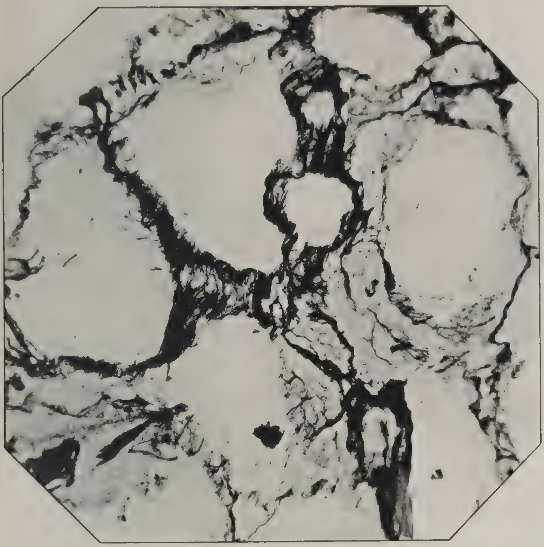

Fig. 256. Connective tissue, collagene.
45 × magnified. (Case I).

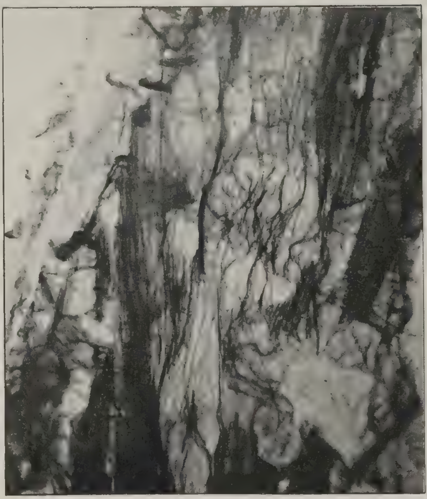

Fig. 258. Connective tissue, collagene.
320 × magnified. (Case I).

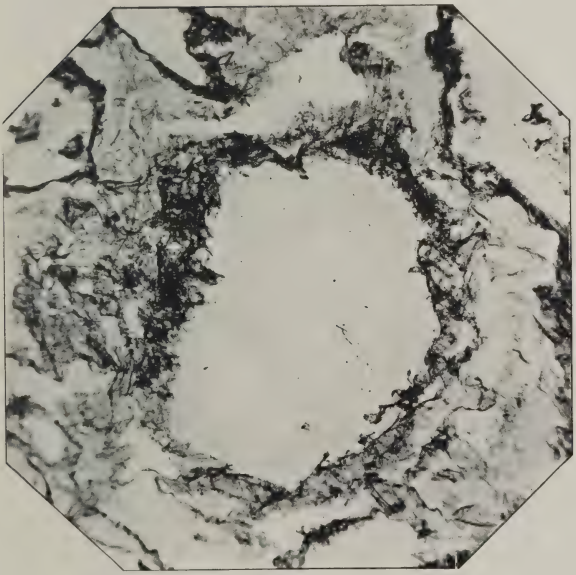

Fig. 257. Connective tissue, collagene.
70 × magnified. (Case I).

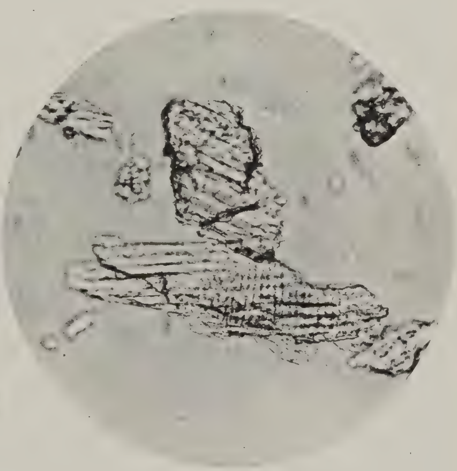

Fig. 259. Enamel from tooth.
275 × magnified. (Case X).

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